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Original Contributions.

BENEFITS OF DENTAL SUPERVISION IN PUBLIC SCHOOLS.

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Phillips Brooks once said, "Moral courage is nothing in the world but the capacity for doing what we know we ought to do."

Now the world of today takes a great delight in educating its children, talks of it, boasts of it, makes a fad of it, introduces so many new ideas, tries so many experiments (we speak of public school children particularly), that wise parents and teachers doubt whether, after all, the specimens of this "system" be not under-educated—and their education according to the old-fashioned sense of the word entirely neglected. If, then, moral courage be what the great divine so aptly expressed it, the guardians of public education are sadly lacking in that attribute, for knowledge on this one subject, that they surely know they *ought* to give the children under their care a common-sense knowledge of the beauty and health and value and care of their bodies, is rarely ever properly supplied.

The child usually is left unlettered on this all-important subject—untaught concerning the value of each individual organ of his body, of the perfect harmony in which, in health, the work of one part complements another, of how the slightest imperfection in one minute detail affects the whole. As a result he suffers in childhood, becomes nervous and querulous in maturity, and maybe never sees a ripe old age, when a few judicious words well spoken, a little judicious care kindly administered and a few well-chosen lessons, well learned, would have transformed his moral and physical atmosphere.

These words of Solomon are often quoted, "Train up a child

in the way that he should go, and when he is old he will not depart from it." Habits are formed in childhood—the child only learns to read, write, or puzzle out the simple problems from repeated exercise in them, until that unwonted exercise, at first clumsily and unwillingly performed, becomes by constant repetition a mental habit. Why can this exercise be not continued along other lines? Why can the child not be taught the language of his body as well as the language of his country, taught to read the sign language of his organs, taught to recognize the code that Nature uses in displaying her danger signals, taught the inestimable value of the great gift that God has given him in the possession of a body, the intricate working of which is more wonderful than the most wonderful machine ever *dreamed* of by human mind, and since our field is with the organs whose health is so necessary to the general welfare of the bodily economy, let us see how a dental examiner in the public schools of our country can improve actual oral conditions and contribute to a fuller knowledge of the same.

Let us first consider the relations between the teeth and the organs of higher sense which lie in such close proximity to the dental organs.

Nasal complications frequently result from an infected molar or bicuspid root, causing inflammatory disturbances in the antrum. The maxillary sinus, as we know, communicates with the nose by a tiny aperture; through this, pus will exude for a time, but inflammation increasing, the opening is closed; the walls of the antrum being porous encroach upon the nasal space, and the air passages become involved, causing not only inflammatory disturbances along the nasal tract, but in many cases compelling the child to breathe through the mouth, instead of the regular air passage, the nose.

This mouth breathing, come from what cause it may, soon becomes a fixed habit, and by the constant open position of the mouth, the vault of the oral cavity is made narrow by the powerful action of the buccal muscles, the air passages, by this narrowing, are also affected and, further, the membranes and spongy bones of the nose, not having their regular exercise, become attenuated, and when the matter is taken in hand, the child must literally

build up its nasal passage before proper breathing may be indulged in.

Other nasal complications are the result of decomposed food matter, derivatives of decay, discharge from abscess, sinuses, tartar, etc., influencing the secretions which flow back into the pharynx and cause congestion. The membranes become inflamed and the inflammation quickly spreads to the surrounding tissues, causing trouble in the post-nasal area, and also standing in causative influence to the growths known as adenoids.

We showed, in an article in the DENTAL DIGEST of December, 1907, how the same cause, just mentioned, is responsible for aural trouble and how certain kinds of astigmatism may be traced to neuralgia of dental origin. We also spoke in that paper of the intimate connection between distant organs and the teeth, as evidenced by infantile disorders during dentition and the exquisite sensitiveness, in many instances, of the teeth during menstruation and pregnancy.

Well-informed physicians acknowledge the influence of the dental mechanism on the gastric well-being by advising sufferers from chronic indigestion and kindred ailments to avail themselves of the services of a dentist, so that the masticatory apparatus may be put in perfect condition, thus enabling the first step in digestion—mastication—to be properly performed.

In this short resumé we have endeavored to show that the teeth bear a close relation to other important organs. Now let us devote our attention to proving how a dental supervisor in our public schools may better the general condition of the many pupils.

One important argument in favor of such supervision is as a preventive of disease. A child having an unclean mouth carries therein that which endangers his very life; for if the hard and soft tissues of the mouth be the abiding place of accumulations of decay, tartar, abscess discharge—food debris—not only is the function of digestion retarded and the product of digestion deprived of the rich, life-giving qualities which are necessary to the health of the individual and the stomach made to do twice its work, but the child, by reason of this lack of tone in the blood (which blood is the final result of digestion), suffers from lowered vitality and be-

comes an admirable subject for whatever disease he may come in contact with.

By this very overworking of the stomach the heart is affected. The stomach being required to cope with the half-masticated food thrust into it, the gastric nerves are taxed to their utmost. This continuous increased action of the gastric nerves stimulates heart action in two ways—first, in supplying the area with sufficient blood to do its extra work, again by reflex stimulation of the cardiac branch of the pneumogastric, which supplies heart and stomach alike. So, like any machine, human or inanimate, which is overworked, the heart becomes crippled and many a case of "heart trouble" might be traced to poorly masticated food, resulting from decayed teeth.

In another way is a child with an unclean mouth a menace to his own health and that of his companions. In health, that is under hygienic conditions, his mouth is the abiding place of from thirty to one hundred different varieties of bacteria. When conditions become unhygienic, these colonies are multiplied a millionfold, so if the child with an unclean mouth be subjected to infection, the bacteria of the disease will gladly welcome a new home when such a warm welcome awaits them, and the child, through the medium of his mouth, develops the disease to whose influence he has been exposed. He menaces his companions by breathing into the atmosphere each variety of bacteria his germ-infested mouth contains. Especially will this be the case if his neighbor be a mouth-breather.

If dental supervisors did no more than correct severe cases of mouth-breathing, much would be contributed towards eradicating that great white plague—*tuberculosis*—for the mouth-breather, as I said before, has a narrowed dental arch from the constant tense condition of the buccal muscles; the nasal passages are also attenuated, the lungs receive only a portion of their needed supply of air, and that portion unwarmed and unfiltered. Nature supports no idle tissue, so not needing the entire bulk of the lungs to perform but a portion of their regular work, these organs become smaller, the blood passing through is not properly charged with oxygen, and the chronic mouth-breather generally presents a drawn face, anemic appearance and a hollow chest, and is a fit subject for,

and in cases an early victim of, that dread disease which claims so many for its own.

Glance at the vitiation of the atmosphere due to unhygienic oral conditions. In a room where from forty to sixty children are seated, it is at best a difficult task to properly ventilate, as each child ordinarily gives off four volumes of carbon dioxid at each breath, besides other impurities. The ordinary schoolroom contains four volumes of carbon dioxid to every 100 volumes of air. Suppose even ten of the children add to the ordinary impurities of each exhalation the poisonous gases of food debris contained in cavities of decay, tartar impregnated with the oral fluids, pus and other oral impurities, think that these gases are immediately combined with the air breathed by all the occupants of the schoolroom, and you will realize that the ten unclean mouths will be factors not to be lightly reckoned with.

Quoting from an extract from the Baltimore *Sun* of June 15 last, by Health Commissioner Bosley, it seems that an unclean mouth may have yet another evil for which to answer—the criminal young. The article is as follows:

"In order to see if the children brought before the Juvenile Court can be cured of the habits, or mental or physical ailments which lead them to commit crime, Health Commissioner Bosley yesterday started a thorough scientific investigation. He will have the medical inspectors of the public schools supplied with the names and residences of these children, so that they may be looked after in their homes during the summer recess."

Dr. Bosley said that what he wanted to know is whether the condition of the children can be improved by medical or hospital treatment.

"If so," he continued, "the Health Department will recommend that they be sent to a physician or hospital. I believe that through proper treatment some of our youthful criminals could be gotten above their present surroundings and brought up to be useful citizens. We will try to get them all into the schools, if possible.

"It may be that some defect in the eyesight or the hearing of the child makes it impossible for the boy or girl to get along well in school. They then play truant, and in running the streets get into mischief and are arrested. It would be a great blessing to the

children themselves and the public in general if we could cure these defects. The idea of bettering the conditions of juvenile criminals has been in my mind for several years. There will be nothing for the medical examiners of the schools to do this summer unless given this work, and I think that it would be a pleasant task to them in trying to raise the standard of so many children."

As to deafness, we have proved that an unhygienic oral cavity stands in active causal relationship to partial deafness, which, neglected, would naturally become intensified; we have also shown that the same cause is responsible for an anemic state of the system, which could produce just such a listless state that a child, rather than spend hours of torture in a class with other pupils, with whom, on account of his physical defects, he cannot cope, plays truant; and as Dr. Bosley acknowledges defects in hearing, and a low physical standard to be responsible for much truancy, I am convinced that a dental examiner, in some cases, at least, by removing the exciting cause, would better the general condition of the child, brighten his mind by the restored health of his body, enable him to keep abreast of his fellows and thereby lessen the probability of truancy and the tendency to gaminism.

This dental examination is especially needed in the quarters of our large cities so densely peopled by the immigrant population—for among these ignorant people, whom we allow to come yearly by the millions to our shores, cleanliness is, to a large extent, an unknown, unexplored volume.

My knowledge of these people is from personal observation, for the Saturday clinic at the Infirmary of my Alma Mater was largely composed of the immigrant class—Russian, Polish, Bohemian and their confréres. Two cases particularly impressed themselves on my memory, and there are many parallels. The first was of a girl who was assigned to my care, and I can safely say that her mouth had received no attention for years. The friend accompanying her as interpreter was called, and told that I could under no circumstances operate for such a case until the patient used a tooth-brush and an antiseptic solution three times a day for several days. A puzzled expression stole over the countenance of the interpreter, as she said, "A toot-brush, a toot-brush, vill you tell me vat is a toot-brush?" A specimen was procured from the cabinet, and its

use demonstrated, and the interested, wide-open astonishment with which the interpreter listened, and the other one watched, showed that that was their first experience with tooth-brush tactics. The lesson was well learned, however, for they both returned at the appointed time with mouths that had profited well from instruction.

The story of the second case has been told so often that it is growing threadbare, but it illustrates so well the positive ignorance of some people of the necessity of oral cleanliness that it must do service again. This woman was the mother of seven children and their mouths were about on a par. I had directed the woman to use a soft clean cloth to cleanse her own teeth and the children's, a separate one, of course, for each, until she could buy brushes for them. It was a difficult task, for the woman seemed to think that teeth were made to care for themselves. One day, however, she appeared, jubilant, "I've bought a brush, Miss Bennett, a first-class one, paid 35 cents for it, and got it good, so we *all can use it!*"

Some are not as amenable as others and they strenuously resist all suggestions for cleaning the teeth or removing disgusting accumulations of tartar, saying it will injure the teeth.

Now if these people in their childhood had been taught that the teeth are valuable organs, given to us for a definite purpose, upon whose use or abuse depends the health or invalidism of the body, there would be no such neglect of oral hygiene.

This would lie within the province of the dental supervisor. A lecture of fifteen minutes or so once or twice a week, setting forth the salient points on the care of the teeth and their important relation to other organs, would materially assist in dissipating the ignorance of the laity on the subject.

The following is taken from an editorial in the London Lancet:

"The alarming increase of dental disease is beginning to attract the attention of the general public, while there are also signs that the medical and dental professions are becoming more alive to the possibilities of dental disorders being important factors in the production of certain general diseases. Dental caries is the most prevalent disease of the human race. There is little doubt that a large number of children suffer from impoverished nutrition solely from neglected conditions of the mouth."

A celebrated personage, one of the most successful diagnosticians

of the world, Prof. William Osler, late of the Johns Hopkins University, now regius professor at Oxford, is in favor of dental supervision in all public institutions. "All children," he says, "should be taught to clean their teeth; all children should have their mouth and teeth inspected; and connected with every school there should be a dental surgeon, and he should make a routine inspection of those children, and report upon them, and should their teeth be bad or dirty, they should be told not to come to school until their teeth were attended to."

The child with bad teeth is a *danger* in a school, and the teeth should be attended to and the county pay for it. Dr. Osler says, "The child with bad teeth is a danger in a school." Let us summarize that danger. Danger to *self*, self-inoculation, danger from lowered vitality, from improper mastication, danger from the mere act of using common drinking cups, danger from dread consumption, inoculation of other children by the transmission of germs, possible danger of cardiac weakness, danger from the lowering of the moral status which results from unclean conditions anywhere in the body, and last, but certainly not least in this schedule of dangers, the probable danger of contributing to youthful criminality.

A well-known authority, lecturing recently on ethics, said words fraught with this meaning: The same code of ethics cannot be applied indiscriminately to all children, on account of mental and physical inequalities, but much may be done to equalize conditions by special attention given to the hygiene, nutrition and social environment of the child.

Now we as dentists may assist in this equalization of matters, we may contribute largely toward the hygienic side of the question by preaching oral hygiene, we may assist even more greatly in the chapter on nutrition by seeing that the organs, which prepare the food for its transformation into the fuel supplying the body, are in proper condition.

If all these ills that the flesh falls heir to on account of unhygienic oral conditions be true, which they undoubtedly are, there is surely a crying need for dental as well as medical supervision in all our public schools, and just so far as a dental or medical supervisor can better the condition of the child, just so far as the child

can be taught that cleanliness must be the watchword of health, just so far as his physical condition can be bettered, and his mental and moral calibre thereby stimulated, in an equal ratio will the nation of the years to come be benefited, for history, ethics, sociology, psychology, *all* kindred sciences prove without question that "the child is father of the man," and not the least of Solomon's wisdom was contained in the proverb, already quoted once in this article, "Train up a child in the way that he should go and when he is old he will not depart from it."

PLASTIC FILLINGS.

BY H. B. TILESTON, D.D.S., LOUISVILLE, KY. READ BEFORE THE ALUMNI ASSOCIATION OF THE UNIVERSITY OF BUFFALO, DENTAL DEPARTMENT.

This may be said to be the age of plastics in dentistry, an era upon which we are but just now entering, but for which dentistry has been preparing for many years. The pioneers of the "New Departure Corps," the now famous triumvirate of more than two decades agone—Chase, Palmer and Flagg—enunciated principles which were not so cordially received then as now. Hence I use the term "now famous," because while they were actively engaged in their campaign for plastics, the majority of the profession did not take them seriously, but were inclined to poke fun at them and to ridicule their ideas. I think most likely that they were not self-styled "The New Departure Corps," but that they were so named by some editorial wit and, like a nickname, it has stuck to them ever since and serves now as a distinguishing appellation.

They were just a little in advance of their time, that was all. True, they were extreme and radical. It was certainly radical for Dr. J. Foster Flagg to have on his door, "No gold used here," but nothing is more true than his statement that, "In proportion as teeth need saving, gold is the worst material to use." At least it was true at that time and for many years after, when gold fillings were made by packing foil directly upon the bare cavity walls. Now we make our large gold fillings by casting them in a mold and setting them in cavities with cement, a method the success of which justifies the modification of the Flagg axiom to

read, "In proportion as teeth need saving (within certain rather indefinite limits) the inlay is the best thing that can be used," to bring it down to date. For many years the operative dentist refused to accept and employ plastics except as a temporary expedient in the case of cements, or as an abomination in the case of amalgam. But new materials and improved methods in the use of old ones have made plastics not only acceptable to the most exacting of their former critics, but have ushered in a wave of enthusiasm in the dental profession in favor of plastics that borders on the hysterical. I venture to say that in the practices of a majority of the dentists of today there are very few fillings put in that are not made up, either wholly or in part, of plastic materials.

The cast gold inlay is a plastic; for what could be more so than molten gold? In its fused state it is forced into a mold representing both the cavity and the external contour of the filling, which in effect is pouring the melted metal into the cavity itself. And last we have plastic gold. I have frequently been asked, by children usually, though sometimes by adults who have never seen a gold filling made, if the gold was melted and poured seething hot into the cavity. I used to answer "no." Now I think I might say "yes," following such answer, however, with an explanation, else my patient might faint with horror or suddenly disappear. Porcelain may likewise be said to be a plastic, for in the form of an aqueous or alcoholic paste, it is molded into a metallic replica of the cavity and therein fused to plasticity and by successive fusings built up to its full form. In effect it is molded in the cavity itself.

Both gold and porcelain inlays are now set in the tooth cavity with zinc oxyphosphate cement, a material heretofore considered as temporary, but which, used in this way, becomes permanent.

Thus do we fill cavities with plastic gold and porcelain, materials which are indestructible, neither shrink nor expand, nor waste away in use, and which are held in place by a cement which seals the cavity hermetically against the ingress of the agencies of caries. There are no leaks about such a filling, no imperfectly adapted areas. A tooth so treated is saved. Thus do we approach very closely to the ideal.

Amalgam was the first plastic used in operative dentistry, a

material which, according to the opinions of many of its ancient enemies, was conceived in iniquity and born to be a curse to high-class dentistry, a stigma which has clung to it almost to the present day.

Although amalgam has been much improved in composition and methods of treatment in recent years, and has, withal, been more or less of a boon to dentistry, it cannot be said ever to have come up to the requirements of a satisfactory filling material in the estimation of careful, painstaking, conscientious operators. The gold inlay is displacing it in many large restorations in molars and bicuspids where formerly amalgam seemed to be the only thing possible to use.

An idea emphasized by, if not directly derived from, the setting of inlays in cement, is advantageously employed in making fillings of amalgam by lining the cavity with thin cement, into which amalgam is burnished while the cement is still adhesive, the latter being completely covered with amalgam to the cavity margins. This, in effect, makes an amalgam inlay.

It is good practice to employ this method with every amalgam filling. It interposes a non-metallic lining between the filling and the tooth pulp, seals the cavity against any change of form in the amalgam in the process of setting, and makes an adhesive union between amalgam and the cavity walls.

The same method may be employed to advantage in the case of gold fillings as advocated by Dr. Joseph Head.

And so I repeat that there are but few fillings put in nowadays that are not made up wholly or in part of plastic materials.

Another very useful combination of amalgam and cement is made by mixing the two separately and then spatulating them together, a method I introduced to the profession about twenty years ago in a paper read before the Kentucky State Dental Association and published in the *Dental Review*. This makes a valuable plastic for large inaccessible cavities in molars which may be difficult to keep dry for any length of time. A mass sufficiently large to make the entire filling is introduced at once and manipulated to form while still soft. A veneer of pure amalgam can be added to the outer surface, to which it coheres perfectly. This mixture of cement and amalgam is very adhesive and when veneered

with amalgam is indestructible. It makes an excellent filling for the deciduous molars.

The most indispensable filling material the dentist has at his command today is zinc oxyphosphate cement. Take this plastic away and the practice of dentistry would be paralyzed, for crown and bridge work and inlaying, as well as the fixing of appliances in orthodontia, depend upon this material absolutely. As a filling material in certain cases requiring an adhesive property and demanding a more or less acceptable color, although it has never been given the desirable attribute of permanency, it has no substitute.

The more recent silicate cements, which now loom large upon the horizon and seem so full of promise, supply some of the deficiencies of the zinc oxyphosphate cements, but are themselves deficient in some of the essentials of a perfect filling material.

In view of the vast importance of these materials to the present-day practice of dentistry, and desiring to secure some reliable and authentic information concerning them to be used in the preparation of this paper, I wrote to Dr. W. V. B. Ames, the well-known cement manufacturer of Chicago, and to Dr. G. Layton Grier, of the L. D. Caulk Company of Philadelphia, propounding a number of questions, to which I requested as specific answers as would be consistent with the recognized necessity of protecting what they might consider "trade secrets." From each of these gentlemen I received very courteous and generous responses, giving me much valuable information, as full and as free as was fair and reasonable to expect.

Neither of these scientific investigators claims for his products anything mysterious or miraculous, but both do claim, and justly I think, that their products are the result of careful, painstaking scientific experiment and study, and the use of the best ingredients obtainable, that the result may be that which most perfectly supplies what the dentist needs. I do not mean to confine the foregoing remarks to these two manufacturers alone. There are others as deserving of confidence and praise as they. And I want to take this opportunity to say that the dental profession is debtor to the manufacturers who are conscientiously endeavoring to supply its needs to greater and ever greater perfection. It takes a wide-

awake man to keep pace with the rapid strides dentistry is making these days, largely through the genius of the men who make things. It is a mistake for dentists to nurse the conceit that, because they are practitioners of experience, they know better how to use things than the maker of them can tell them. Read and follow directions carefully, at least to begin with, for these have been learned by a series of experiments and tests that the dentist has neither time nor facilities for making. Especially is this true concerning the use of materials involving chemical reactions, as is the case with the zinc oxyphosphate and the silicate cements, with which the average dentist is not familiar.

The powder of all makes of zinc oxyphosphate has as its basis zinc oxid. Metallic zinc is obtained by roasting the ore. The zinc thus obtained is heated with charcoal, which absorbs the oxygen and the volatile zinc distills over into a receiver, giving pure metallic zinc. Zinc oxid is obtained by combustion of metallic zinc in earthen chambers through which passes a current of air. By this method zinc oxid is made by manufacturers to be used in the arts—paint making, etc. The manufacturer of dental cements obtains his zinc oxid from the stock in these factories, selects carefully the best of it, washes and purifies it with acids, after which it is calcined or fused at a proper degree of heat, ground in a mill and bolted to secure a fine, uniform powder. (G. Layton Grier.) Dr. Ames says that the heavy preparation of zinc oxid is obtained either by long calcining or by ignition of zinc nitrate.

To the zinc oxid, however obtained, the maker of a dental cement adds the oxids of certain other metals to modify its working properties or to impart various shades of pigmentation. Dr. Ames says that rapidity of setting of the cement is modified to a degree by the coarseness or fineness of the powder, the finer ground powder causing rapid setting. The greatest strength, however, is obtained by using a powder showing some evidence of grit. He says also that the setting of zinc oxyphosphate cements can be greatly and beneficially modified by the addition of the oxids of other metals, such as copper, iron, mercury, gold, etc., for pigmenting purposes, which themselves can make cements with phosphoric acid.

The liquid used with this class of cements is phosphoric acid

modified in various ways by different makers of dental cements. Formerly glacial phosphoric acid was generally used, which is a mixture of metaphosphoric acid and sodium phosphate.* Dr. Ames states that cements made with glacial phosphoric acid are porous and friable and more soluble than when the fluid is made by working into orthophosphoric acid the phosphates of some of the non-alkaline metals, such as magnesium, zinc, aluminum, copper, silver, etc., which will impart desirable working properties and a less porous texture.

A concentrated solution of phosphoric acid cannot be successfully used by the dentist for the reason that it would set too rapidly, with generation of considerable heat, and would be granular. Dr. Grier says that an 85 per cent solution would cause immediate setting and great heat, hence water must be added to keep it under control, while Dr. Ames states that the addition of water quickens setting. Probably this difference noted in the influence of the addition of water arises from the employment in one instance of sodium phosphate, and in the other of non-alkaline phosphates as modifying ingredients of the phosphoric acid.

Both the powder and the liquid are hydroscopic and must be kept well stoppered to prevent the absorption of water from the atmosphere, thus altering its working properties as the cement grows older in the operating case.

We were formerly cautioned by the makers of all cements to keep fillings dry for from fifteen minutes to half an hour, the longer the better. Now many manufacturers are furnishing a product which is called "hydraulic," which is said to be benefited by being subjected to moisture immediately after it has been placed in position upon the dried surface. This hydraulic or submarine property is obtained by modifying the liquid by the addition of certain phosphates. In just what way the result is brought about is not fully explained. Probably an excess of the modifying phos-

*Glacial phosphoric acid is metaphosphoric acid, H_3PO_3, and is a solid. The so-called glacial phosphoric acid used as the liquid for cements may be metaphosphoric acid *modified* with sodium phosphate, but chemically considered, glacial phosphoric acid could not be "metaphosphoric acid and sodium phosphate," for the reason that no salt, as such, can enter into the chemical composition of any acid.—Editor DENTAL DIGEST.

phate is used, which, being soluble, is withdrawn by contact of moisture with the mass of cement.

The attention of the dental world is now focused upon the new plastic known as the silicate cement, presented to the profession by the different manufacturers under various titles, as Artificial Enamel, Translux, Berylite, etc. Doubtless many new names will be added to the list as other manufacturers come into the field.

The powder of the silicate cement differs radically from that of the zinc oxyphosphate. As the name indicates, it is made up of the silicates of certain minerals, chiefly aluminum silicate, which occurs in enormous quantities in nature, principally in the form of feldspar, kaolin and clay, materials which are familiar to us as ingredients of porcelain and earthenware.

Ultramarine is also an aluminum silicate and is used as a coloring material, though it may not be used in the making of the dental cements.

The manufacturers of Ascher's Artificial Enamel state that their powder contains 54 per cent of silicates, made up of aluminum, calcium and magnesium silicates and about 20 per cent of the berylium silicate. To the last-named ingredient they attribute "the wonderful success" of their material, and say that there is no other substance in the world that will make an absolutely insoluble filling material of the plastic variety. They claim to hold a patent which gives them the exclusive right to use berylium in this way.

Berylium belongs to other zinc groups of metals and is classified with lithium, titanium and thorium, and some others, as rare elements or rare earths. The silicates of any or all of these rare elements may be used in small percentage in the making of a silicate cement powder, to exert a modifying influence as regards setting, density and translucency.

Dr. G. Layton Grier, of the L. D. Caulk Company, tells me that they have selected of these rare elements thorium silicate, believing it to give a higher degree of translucency, greater density, and more tooth-like appearance than berylium or any of the others, and besides is insoluble in nitric or hydrochloric acids, and dissolves in strong sulphuric acid only after prolonged heating.

Translux is composed of the aluminum silicate and thorium silicate, and the binding property is the calcium silicate. These in-

gredients are fused together at a temperature approximating 3,000° F. and afterward ground and finely pulverized.

Although "Berylite" derives its name from the element berylium, Dr. Ames says he uses very little of it, as he finds it serviceable only in producing a dull white product and to him is of the least value of the allied rare earths.

The liquid of the silicate cements is practically the same as that of the zinc oxyphosphate cement. Dr. Ames originally furnished the liquid in two parts to be combined by the dentist when mixing the cement, but he has since combined them into what he calls his silica jelly, which he claims to be a radical innovation, but fails to say in what respect it differs from the ordinary phosphate cement liquid, or from other silicate cement liquids.

Dr. Grier tells me that the liquid of Translux is composed of "orthophosphoric acid, modified with aluminum phosphate and other ingredients used to control the setting of the mix."

The constituents which enter into the composition of a silicate cement resemble very closely those used in the manufacture of a porcelain tooth, the difference lying chiefly in the method of bringing the constituent elements together.

In making a porcelain tooth or an inlay, the ingredients are combined by fusion, while in the case of silicate cements the union is effected by mixing the powder and liquid together, the porcelain being the result of chemical action.

Dr. Grier aptly calls the latter a "chemical porcelain" and directs attention to the fact that a chemical porcelain cannot have the strength of a fused porcelain, and must not be relied upon to withstand stress when exposed upon incisal corners or in contour restorations in molars and bicuspids. I have one case under observation where I restored an incisal corner of an upper central with Ascher's Artificial Enamel, involving a third of the incisal edge, which has been in place more than six months and shows no change. It is liable, however, to meet with disaster at any moment, for this material is brittle.

Silicate fillings exposed upon occlusal surfaces chip away at the margins under the impact of mastication, for which reason they are not indicated in this class of cavities.

Great importance attaches to the proper manipulation of the

silicate cements from the time of making the mix to the final finishing of the filling. The best slab to use is one of heavy glass with ground surface. The spatula should be non-metallic for the reason that the powder is sufficiently gritty, together with the ground glass slab, to grind off an appreciable quantity of the metal in making a mix, which not only affects the color of the cement, but alters its chemical composition.

A spatula of bone, ivory, tortoise shell or agate gives the best results, the last named probably being better than any other. The instruments for introducing and shaping the filling should also be of one of these materials. Slab and spatula must be scrupulously clean and free from any remains of a former mix.

In mixing, a small portion of the powder should be drawn into the liquid and thoroughly spatulated with *all* of the liquid, then another portion of powder is drawn in and again thoroughly spatulated, this process being repeated until the desired consistency is reached, occasionally scraping the mix together with the spatula and spatulating again, the object being to bring every grain of powder in contact with liquid so that the porcelain making chemical reaction may be complete. Just what consistency is proper for the mass is difficult to describe except to say that it should be quite stiff but perfectly plastic. Experience alone can teach one just what is the best working condition.

The rubber dam should be used in every instance. If you cannot place the dam in any given case, then use some other filling material, for the conditions cannot be made right for a silicate cement. The cavity must be thoroughly dried with warm air and alcohol and everything made ready before the cement is mixed, which, when brought to the proper consistency, is conveyed to the cavity and packed into it with a non-metallic instrument.

If the cavity is upon a proximate surface, of an incisor for instance, a thin celluloid strip slightly vaselined is inserted in such manner as to cover the mass of cement, bent over upon labial and lingual surfaces and the material drawn against the walls and margins of the cavity, and while the strip is held firm the cement is burnished with a flat steel burnisher used with great pressure on the celluloid strip, forcing the cement into all parts of the cavity and over the margins, shaping it as desired. The transparency

of the celluloid strip permits the filling to be seen plainly through it. The strip is immediately removed and any excess trimmed off toward the margins with a flat ivory point, which has been smeared with vaselin. The purpose of the vaselin on strips and instruments is to overcome the tendency of the cement to stick to them and be drawn away from the cavity margins. Great care must be exercised to avoid getting vaselin in contact with cavity walls or margin or becoming incorporated with the cement.

If it were possible to be so accurate in determining the exact quantity of cement required and in burnishing it to form with the celluloid strip that no further finishing would be needed, the filling would then be in an ideal condition as to its surface, which is smooth and polished. I have not yet acquired that degree of skill, but find it necessary to trim away some excess in every instance. I see no objection to using a sharp steel chisel to trim the cement away after it has set fairly hard, using vaselin to keep from leaving any mark on the surface from the steel. In shaving the cement flush with the cavity margins the chisel should be used toward the filling, passing from enamel to cement. If the chisel is used the other way the cement is liable to be trimmed lower than enamel margin, as at this stage it is still rather soft and easily cut. The filling is now further shaped with a thin linen cuttle-fish strip and vaselin, continuing to use the strip until every vestige of grit is gone from it and the surface of the filling is perfectly smooth. It can be further polished with fine pumice on vaselined strip or rubber cups used with the dental engine, and finally burnished with ivory points and vaselin. In this manner a fine porcelain-like surface can be imparted to the filling.

Dryness of the filling must be maintained for fifteen to twenty minutes after insertion, as moisture admitted before the chemical reaction in the mass is complete draws away the phosphoric acid from the exposed surface, due to the strong affinity of water for this acid, leaving the surface granular and easily rubbed away. If it is inconvenient to keep the dam on so long, the surface of the filling can be protected from moisture by coating with hot paraffin.

The silicate cements are not adhesive. They appear to be so, but experience proves that they are not.

The way the cement sticks to slab and spatula led me, and most others at first, I think, to doubt the assertion of manufacturers that cavities must be prepared with undercuts for retention. After a few fillings fell out that were not mechanically held in place, I concluded they were right about it. Of course, then this cement is not to be relied on for setting porcelain inlays as advised by some. On account of its translucency it would be an excellent cement under porcelain inlays if it would only stick. It adheres to slab and spatula only so long as there is some free acid under it which acts by capillary attraction to hold it there until crystallization is complete, or it is wet, when it comes away easily.

In some cases where a retentive form of cavity could not be secured for any reason, I have resorted to the use of thin oxyphosphate cement placed on the floor or axial wall of the cavity, into which the silicate cement is pressed while the former is still soft and adhesive.

By this means I believe such fillings will be safely held in place.

I have read and heard the statement made that silicate cements contract and leave a worse crevice at margins than a badly fitting porcelain inlay after the line of cement has washed out. I have been using this material for two years, and have put in a great many fillings, and I have not observed either any tendency to contract and draw away from margins, or to waste away by solution or attrition upon exposed surfaces. I have observed the chipping off of margins under direct stress, but that was due to friability and not contraction.

Colors are not difficult to match to teeth, because of the translucency and tooth-like appearance of the material and the perfect blending of filling and tooth due to the close joint, which is practically invisible. Matching the tooth shade is more satisfactory with silicate cements than with porcelain because the former is homogeneous throughout and transmits, to some extent, the color of the tooth, while with porcelain, an inlay which is perfect in shade when tried in the cavity before setting is entirely changed when set, due to the stratum of opaque cement underneath the porcelain.

A great variety of colors is not necessary. A few shades of yellow and gray, with a brown and a blue of intense hues for darkening purposes, and a white for toning to lighter shades, will,

after a little practice in blending, enable the operator to match almost any tooth.

While the filling is dry it appears much too light in color, but when covered with vaselin, or when wet with saliva, the true color is again developed.

I have used Ascher's Artificial Enamel, Caulk's Translux and Ames' Berylite, and I don't find a great amount of difference between them. Ascher's mixes a little smoother and works up a little easier than the others.

A comparison of thin wafers made from a mix of each shows by the transmission of light, when held in front of an electric bulb, that Translux is noticeably the most translucent, Ascher's next and Ames' the least so.

Both the powder and the liquid of the silicate cements are hydroscopic and great care must be exercised to keep the bottles well stoppered. The liquid should always be shaken or stirred with a glass rod before using, as some of its ingredients will settle to the bottom, and fluid taken from the upper surface will not contain all the elements.

My experience with the silicate cements has inclined me strongly in their favor and I can see a great future for this material in dental practice. I see no reason why it should not take the place of all gold fillings on the proximate and labial surfaces of teeth in the front part of the mouth, where, when skilfully used, it looks better than porcelain. If it looks better than gold, and proves by test of time to last as well, why should not gold be banished from all visible places in the human mouth? Then, the use of porcelain will be restricted to corners and incisal edge restorations.

If the silicates possessed edge-strength and adhesiveness, and all the good properties they appear at present to have are genuine, it would then appear that we need look no farther for the ideal filling material.

It is my conviction that there exists somewhere in nature everything that humanity in all its activities and phases of existence needs, and by faithful and persistent research they can be brought to light. If the silicate cements do not prove to be all we have hoped for, men will seek on until the essential elements have been discovered, and the ideal filling material will yet be achieved.

RECREATION.

BY J. M. HAYMAKER, D.D.S., RIDGELY, MD.

In reading the January number of the DENTAL DIGEST I came across an article that interested me very much; and that was "Recreation for the Busy Dentist," by Dr. Allan Gordon Bennett. This is a subject that we cannot discuss too much, as there is no professional man more confined to an indoor life than the busy dentist; therefore I think that everyone should have his system of exercise morning or night; or, if we have sufficient time, we should exercise both morning and night. I have adopted a *regime*, which I think will meet the demand of any dentist. I speak from experience, not theory. I use an exerciser morning and night about fifteen minutes each time. The morning exercise is followed with a cold sponge bath and then a rub-down with a Turkish towel, until I feel all aglow. Now, I would not advise anyone to start right into taking a cold bath if they are not accustomed to cold water. The best way to start is with tepid water, then, after that, decrease the temperature of the water by degrees until it is cold, but each one must feel his way gradually so it will not produce a shock to the nervous system. I can take a bath ice cold without the slightest ill-effect. After my baths I feel like a new man to begin my day's work.

I know my patients derive as much benefit through my work as the pleasure it gives me to do the work. I am acquainted with a few dentists that are miserable half their time and it is caused by indoor life and lack of exercise. There is no excuse for such a condition, and if you advise them they say, "Oh! we have not the time to spare." There is none of us but that can spare ten or fifteen minutes morning or night. A few years ago I was advised to leave my location on account of my health. In speaking to a friend about it, he advised me to take physical culture; so I started into the work and adopted or outlined my course and worked unremittingly. As a result I gained forty-five pounds and a strong constitution; but since I recovered my health I just take enough exercise to keep in good health. We poor dentists are under a nervous strain all the time, trying to please our patients. I agree with the author previously referred to, that each one of us should

take daily exercise and, if we could spare the time, to take one day each week from our office to be indulged in good healthful exercise in the open air. By so doing we could prolong our lives several years and enjoy the health and pleasure that is due us, for we are very useful gentlemen in this world.

Now, I don't want the readers of this article to think I am a fanatic on this subject, because I am not. I enjoy all articles pertaining to dentistry just as much, but we do not advocate recreation enough in our journals, and I know we would be both physically and mentally stronger if we would live up to the laws of health.

A PLEA FOR A MORE CAUTIOUS DISPENSATION OF OUR DUTY.

BY BERNARD BRAMM, D.D.S., CHICAGO, ILL.

There is an erroneous idea prevailing among some of the dental profession in not properly understanding the good and the bad that may be derived from the indiscriminate use of common table salt.

To direct a patient to use this agent freely on massaging the gums for the purpose of restoring or rehabilitating that morbid or indolent condition, characterized sometimes as marginal gingivitis, seems a probable misconception of the thorough knowledge of dental therapeutics, accompanied by a limited sphere of remedies, which might have otherwise been found in the dental armamentarium.

In the first place, a patient who has not been trained to a *gentle yet firm manner* of manipulating his fingers, should not attempt such procedure, for, on the contrary, he is apt to inflict a serious injury, causing the gums to recede, become tender, swollen, and to bleed at the slightest touch, ending, perhaps, in a true gingivitis that is sometimes difficult to combat and, above all, a peeling-off process may take place, such being due to the abrasive and penetrating nature of the salt.

Would it not be better for both dentist and patient, if we aim to accomplish the wholesome effect that is indicated by massaging the gum tissue, to do that intelligently in our own offices, and would it not be more profitable to instruct our patrons in a scien-

tific manner how not to abuse such delicate tissue as that of the oral cavity? No matter how much resisting power it opposes to bacteria, and no matter to how much stress the human jaws and teeth may be subjected in the gnathic test, once it becomes diseased, one need be careful in the dispensation of his professional duties. In no other profession, except perhaps in the branches of the higher science of medicine and surgery, is this so true as it is in dentistry.

Such advice as, "Take this or that and rub your gums morning and evening," means that many patients will go home and start to rub the life out of their gums and unknowingly cause a serious injury. Let me here emphasize the fact that an impairment that has been brought about by overfriction may be purely classed as a mechanical irritation and which is, in my opinion, much more difficult to treat than any of the various manifestations having different sources.

Because of the fact that the gum tissue at this state is so badly bruised and swollen that counter-irritants are not tolerated as in other pathologic conditions, the regular brushing of the teeth must, as a matter of fact, be suspended on account of the extreme sensitivity about the teeth and the intolerance of the tooth brush. The result of this is that the patient is not in that desirable receptive mood. To such an extent is this recognized that now it has become an important factor in hospitals, where patients are convalescing, to materially add to their comfort by properly caring for the patient's mouth.

Lack of properly masticating the food, and intolerance of nutritive food, makes it possible for some organic disturbance, and with all these, no one can foresee the outcome.

There is no doubt but that much good is derived by instructing our patients to properly massage their gums, thus aiding us in rehabilitating sluggish conditions; but I see no necessity for the salt, since we have at our command remedies by the use of which we could cure a case of simple gingivitis. We cannot afford to ignore such an incident; if we do, our recompense is justly due.

Many dentists look back to the past and wish they had never entered the field of dentistry, possibly because of a limited knowl-

edge of pathology and therapeutics, or is it by reason of their unwillingness to "observe, compare, reflect, record?"

Some years ago a new method was devised for the treatment of pyorrhea and various other pus-forming diseases. *Dentists used to massage the gums with iodoform.* We will admit that iodoform, brought in contact with the tissues, sets free iodin, and that it has done its work to some appreciable extent fairly well. But think of the patient and the predicament in which he was placed. With his mouth saturated with iodoform, one can imagine the amount of confusion predominating at such times, *and were it not for the fact that some painstaking men in the profession endeavored to supplant such treatment in our dental practice, we would still, perhaps, be using it today.* I cannot believe that it is wrong in me to use such an analogy incident to the use of table salt, as the latter is used today where it ought not to be. My plea is chiefly for just a little more caution in the well-meant endeavor in the rational discharge of our duty toward our patients.

Much is said these days about the conduct of an office practice; how to equip our offices and share the privileges to which we are justly entitled, how to exercise our fatigued muscles after the day's work, and all of these are very essential; but much more emphasis should be placed on the fact that after we have perfected the much-desired environment, and have achieved the desired surroundings, we should really and truly discharge our duties.

Studying each individual case that presents for treatment is my only pastime. I also have sufficient sport, so as to relieve the monotony. Work and thought go hand in hand, and, if accompanied by a sufficient amount of sport, will not deteriorate our bodies prematurely. One has only to systematize these factors, and he need not fear any disastrous results.

Many good men, hardly in the prime of life, however, have been lost solely on account of having run their machine until it exploded. They failed to systematize their work. This fact is substantiated by reason of our having good old men in the profession, and they will probably tell you how they reached their old age; in fact, when you meet them at social functions or at dental societies they display jovial faces and are, comparatively, boys.

Another instance occurs to me. This is a case where a parent

and his little four-year-old girl called at my office late at night for the relief of a toothache. Upon examination I found the little girl's mouth in a most distressing condition, a gangrenous gum extending from the lower incisors to the angle of the jaw, involving the outer portion of the face around that region, this being seriously eschared. Interrogating the parent as to the cause of such a pitiable condition, I ascertained that he had previously visited a dentist and that the little girl, who had never been in a dental office before, got unusually frightened and refused to submit peacefully to treatment. The efforts to subdue her failed, and so the dentist recommended the purchase of tincture of iodin.

Parents are usually willing to sacrifice their lives, if need be, for their little ones; and so, like the man who was directed by the physician to take a teaspoonful of an internal remedy every four hours, and went home and drank the entire quantity at once, thinking relief would be instantaneous, the parent of this little girl took a large piece of cotton, wound around the tip of his lead pencil, dipped it in the iodin and commenced painting the little girl's mouth.

He himself, inexperienced in the handling of poisonous drugs, meaning well, however, and the girl willing to have her papa's fingers in her mouth but not the dentist's, together with the dentist, who unquestionably meant well, except in permitting the parent to handle the drug, placed me in a very peculiar position.

I finally took the little girl on my knee, as I was sitting in the reception room, and treated her as best I could. It was somewhat difficult to gain her confidence, but in this I am invariably successful with young folks of her age.

Recommending the necessary antidotes, followed by subsequent office treatments, the little girl has recovered and is now threatening to institute judicial proceedings against me for not keeping my promise in presenting her a Texas pony, which I had faithfully promised her should she submit to be treated.

In this case, like the others cited, one may readily see the fallacy in directing patients to do things which, by right, you should do yourself.

We have our hands full at times with stubborn cases where patients purchase "toothache wax" or "oil of smoke" for the purpose

of rubbing on their gums or to be placed in cavities to "stop" or "kill the nerve" and then call upon us with faces that look more as though they had been preserved in creosote. It should, therefore, appeal to our reason and serve as a lesson in being cautious about giving our patients the liberty of using something of which and with which they are not familiar. In this intense nervous condition, caused probably by a blind abscess, a pericemental abscess, pulpitis, or another cause of pain about the dental region, where these subjects are of neurasthenic tendencies, their mind is *temporarily dethroned* and they should, therefore, not be trusted with any remedy. Indeed, I have had cases of odontalgia, associated with hysteria, very often in my office, where the bracket-table was kicked by the patient and a spittoon-bowl broken. Such important factors lead me to believe it worth while to carefully investigate the phenomena of pain. They are worthy of careful consideration, as it posts and fortifies one to be prepared for all emergencies.

In this article I am desirous of emphasizing that no malice is intended. I am simply making a plea for a more conservative and judicial adherence in the discharge of our duties. Being an ardent and devoted participant in our cause is my reason for thus making my report to the profession.

In concluding, I desire to quote an extract from an essay of the president of a southern medical society. In his opening address, which went to my heart, as well as to the hearts of its many hearers, he said, commencing with a biblical aphorism:

"Behold how good and how pleasant it is for brethern to dwell together in unity." Continuing he went on:

"No one, today, may ignore or despise the power of cooperation. Second to cooperation comes organization, and succeeding this, administration. This is the order observed in harnessing great natural forces, such as electricity, water, gravity, etc.

"We should, therefore, have in the conduct of this society (1), cooperation; (2) organization, (3) directed cooperation or management. This sequence is necessary to secure results and results are what we are after.

"All growth is from within or without. May we grow in both directions."

Digests.

SOMETHING OF THE TECHNIQUE OF FILLING WITH GOLD. By Arthur D. Black, B.S., M.D., D.D.S., Chicago, Ill. There are two requisities governing the outline form of cavities for decays beginning in defective pits or fissures: First, that all enamel that is unsupported by sound dentin should be cut away, the cavity wall in the enamel and dentin being practically a plane straight surface without undercuts; second, that any sharp groove in the enamel that would prevent the making of a smooth margin should be cut out as far as might be necessary. In the preparation of cavities for decays beginning in smooth surfaces of the teeth the thing of first importance is the anticipation of future results of the existing conditions by cutting away sound enamel and dentin to enable us to place our cavity margins in safe positions so that natural forces would prevent a recurrence of decay.

The internal portion of all cavities should be box-like in form, with surrounding walls parallel and the seat at right angles to the surrounding walls and the line of junction of the seat and surrounding walls right angles. The advantage of using a flat-ended bur, such as an inverted cone or fissure, is emphasized.

It would be interesting if we could know what percentage of failures occur because of improper cavity preparation as compared with the failures from faulty manipulation and technique in filling. It will, of course, be of little advantage for one to properly prepare cavities if he is unable to make good fillings. The large majority of the operations performed by dentists today are gold foil fillings, and a very large percentage of our incomes is now derived from this source; I believe this statement will and should hold good for many years to come, notwithstanding the present enthusiasm for inlays. I fully believe that there should be a gradual increase in the percentage of inlays used by the profession as a whole, but their number will, for many years at least, be in the minority as compared with foil fillings.

In presenting something of the technique of fillling with gold, I have selected a few of the most essential points and we will consider each separately.

The Area of Plugger Points.—There is not time in this paper for a proper discussion of the sizes of the plugger points, but I must

call attention to the fact that the force required to condense gold is about a fifteen-pound blow with a plugger point one millimeter in diameter, and the amount of force required with a larger point increases in proportion to the square of the diameters of the plugger points. In other words, if it requires fifteen pounds for a plugger one millimeter square, it will require four times fifteen, or sixty pounds, for a point two millimeters square to give the same condensation. As a fifteen-pound blow is about the limit of force that should be used in the average case, it follows that we should not use a plugger point larger than one millimeter in diameter if we are to get proper condensation.

Starting Cohesive Gold Fillings.—In starting a filling with cohesive gold there should generally be made some special preparation of the cavity for the purpose of anchoring the first piece, or the first several pieces in a mass, so that it will be held firmly without tendency to rock or be dislodged as the filling progresses. The most convenient way to do this is to cut with an inverted cone bur a small, flat-seated depression at one of the point angles where the seat meets two of the surrounding walls. This should generally be in the most convenient angle for access, such as the point where the pulpal, distal and lingual walls of a simple occlusal cavity meet. Such a depression is easily made by placing the flat end of the inverted cone bur against the seat or pulpal wall, then pressing the bur sidewise into the line angle formed by the junction of two of the surrounding walls and drawing the bur out of the cavity, cutting less and less deeply into the surrounding walls as it is withdrawn. It is often desirable to make two of these starting points, one on the lingual and one on the buccal side of the cavity. It is generally better to cut these starting points by pressing the bur laterally into the surrounding walls than to sink it into the dentin below the level of the seat of the cavity. In any case the cut should be a very small one, no larger than half the head of a one millimeter inverted cone bur.

Two instruments should be used in placing the first piece, and generally the first few pieces of gold, a plugger and a holding instrument. The plugger should be small enough to slip easily into the starting point that has been cut, yet large enough not to punch through the gold. An amount of gold that will a little more than fill the starting point should be placed in that portion of the cavity,

then folded over into a small mass and finally pressed or driven home with the plugger while the holding instrument is held firmly on the mass. The holding instrument should not be removed from the mass until enough gold has been added to form a solid and fixed mass in that portion of the cavity. If two starting points are used, then the holding instrument should nót be removed until the second point is filled, a solid mass connecting the two. If it is desired to change the position of the holding instrument, this may be done by holding the mass firmly with the plugger while the holding instrument is lifted and replaced. If there is a dentist in this audience who has occasionally had trouble with a filling rocking so that it had to be started again, I assure him that he can be free from that in the future if he will make a box-like cavity preparation with sharp angles and follow the simple rules mentioned in starting his fillings.

There are three essential points to be considered to secure a proper adaptation of gold to cavity walls: First, the gold should be kept in a solid mass as the filling progresses, and the attempt should never be made to build a thin layer of gold over a wall. Such an attempt is apt to result in failure, as the subsequent malleting will cause it to curl up slightly. After the starting point has been filled more gold should be added in such a way that the area of each of the three surrounding walls covered by the gold will be about the same at any one time. In other words, the gold should be built out to cover the seat of the cavity no faster than it is built along the surrounding walls toward the external surface of the tooth. This keeps the gold at all times in the most compact possible mass, and as each additional piece is addded that previously placed is driven more closely against the walls, instead of being drawn away.

The second essential is to have the force applied in the right direction. Never overlook the fact that you cannot condense gold and secure adaptation by having your direction of force at right angles to the wall. You might as well try to flatten a sheet of metal by striking it again and again on one side while holding it on an anvil; as one part is driven against the anvil the surrounding metal draws away and the more you hammer the more convex the piece becomes on its under side. To secure the best adaptation the direction of force should be at an angle of from six to twelve

centigrades, or from about twenty-two to forty-five degrees with the wall that is being covered, the point of the plugger being toward the mass of gold already placed. In other words, if the gold has been built to an equal distance on the seat and surrounding walls, the plugger held at right angles to the surface of the gold will give the right direction of force to build more gold over either of these walls.

The third essential in this connection is the proper stepping of the plugger in covering a wall. As each additional piece of gold is added to the mass the bulk of that piece should be in contact with the mass already placed and a small portion should extend beyond the mass, covering more of the cavity wall. In condensing this piece the first blow of the plugger should be struck as near the center of the surface of the mass of already condensed gold as possible and the succeeding blows should be struck so as to gradually approach the edge of the mass of already condensed gold and finally condense the portion of the new piece that covers the cavity wall, driving it against the wall and the previously condensed gold at the same time. If the edge of this new piece that covers the cavity wall is condensed first it is apt to be drawn away by the blows struck in condensing the remainder.

In positions where it is impossible to get proper access to hold the plugger at an angle of six centigrades, as is often the case in condensing against the buccal wall in bicuspid and molar cavities, good adaptation may be secured by what is known as the wedging principle. In fact, the plugger may be held almost parallel with the wall and yet make a tight filling. Each piece of gold is placed in the cavity with one edge against the wall and it is condensed by the stepping process, the first row of blows being struck along the edge furthest away from the wall and succeeding blows in rows parallel to the first, gradually approaching the wall, so that the last row of blows, with the plugger held almost parallel to the wall, will force the last strip of gold between that already condensed and the wall itself, thus wedging it between the two.

Positions Where It Is Difficult to Get Proper Access.—There are certain walls of the various cavities that present difficulties of access, and we will consider several and present special methods of securing proper adaptation.

In occlusal cavities in the bicuspids and molars, and particularly

in lower teeth that are inclined lingually, it is often difficult to get proper access to condense against the mesial and buccal walls. Oftentimes a little additional trimming of these walls, inclining them a little more to the mesial or to the buccal, will enable us to get good adaptation by using the wedging principle. If the teeth are inclined too much for this, then a reverse plugger, or hand pressure, must be used.

Probably more failures are made in covering the gingival wall of proximal cavities than elsewhere. In mesioocclusal cavities it is generally impossible to get the proper direction of force on the gingival wall on account of the proximating tooth. The closer we approach the margin of the gingival wall the more nearly perpendicular a straight plugger must be held and the more imperfect is the adaptation. In such cases the proper direction may be easily secured for all of the gingival wall by using a contraangle plugger, which is bent to reach over the distoocclusal angle of the proximating tooth.

In distoocclusal cavities the proper direction may be secured by using the reverse pluggers or by cutting away a little more of the buccal wall so that access may be had from the buccal direction for all or nearly all of the gingival wall. In some cases most of the gingival wall may be covered from the buccal direction and the final condensation against the buccal extremity of the gingival wall may be accomplished by hand pressure. In most cases a very little extra cutting of the buccal wall will reduce the amount of gold to be condensed by hand pressure or reverse pluggers to the minimum.

In the majority of proximal cavities in the bicuspids and molars, both mesioocclusal and distoocclusal, non-cohesive gold can be used to advantage on the gingival wall. Its proper use insures perfect adaptation to the gingival wall and makes the entire operation easier and more quickly done. A cylinder of gold may be prepared for the particular case from a sheet of foil, or a half or a third of a sheet, according to the size of the cavity. The piece of gold should be folded over several times into a long strip that is a little wider than the width of the gingival wall in the mesiodistal direction. It should then be rolled up on a flat instrument, such as a straight chisel, and when rolled should be large enough to crowd against the buccal and lingual walls when put in place. No attempt should be made to condense this gold; it should be firmly

pressed down with a large flat end instrument, such as an amalgam plugger. The cohesive gold is then placed over it, good anchorage being secured by building across from lingual to buccal and then gradually building to the mesial or distal, as the cavity may be located, thus crowding the non-cohesive gold tightly against the gingival wall at the margin.

Proximal fillings in the front teeth occasionally fail on account of improper preparation of incisal retention or on account of improper condensation of gold in this position, or both. The incisal retention in such cavities should never be cut with a bur on account of the danger of undermining the enamel. This retention should consist of a definite groove, rather than a pit, which should curve around the incisal from labial to lingual. Such a groove can be easily prepared with a hatchet excavator bent at a little more than a right angle. The groove should be cut entirely within the dentin so that there will be no unsupported enamel. A hand-pressure plugger, the point of which is also bent at a little more than a right angle, should be used in condensing the gold in the groove. The plugger should be tried in the groove when the cavity is being prepared to be certain that the groove is wide enough to admit it and deep enough to afford proper anchorage. Care should be taken not to build the gingival portion of the filling too far toward the incisal groove, as considerable room is necessary for the manipulation of the plugger in filling the incisal portion.

Covering Margins.—In covering the enamel margins it is important to have a considerable bulk of gold. A thin layer of gold should not be condensed over a margin for the same reason that a thin layer should not be used in covering a wall, because it will draw away as the next piece is added. Care should of course be taken not to chip the enamel margin with the plugger. It is an excellent plan to use a point that is slightly convex, thus avoiding the possibiilty of bringing a sharp angle in contact with the enamel and so fracturing same.

Finishing Gold Fillings.—There is no particular difficulty in finishing fillings in occlusal cavities, and we will not consider them. In finishing fillings in gingival third cavities in the labial and buccal surfaces the only difficult margin is the gingival, and it is too often left with a considerable overlap. This can generally be easily and properly trimmed with a sharp finishing file or knife.

There is room for the blade of either between the free margin of the gum and the tooth, and the filling may be trimmed without injury to the gum. The proximal cavities are the most difficult to trim and polish, and I wish to present a simple and systematic plan for them. First of all, a separator should be in place (very preferably a Perry Separator, which does not injure the gums and gives room for operating). In placing the filling, enough separation should have been secured to allow for the necessary trimming of the proximal surface and yet restore the proper contact. After the filling is finished, the separator should be tightened just enough to make a slight space between the filling and the proximating tooth. A cut should then be made with a saw held against the surface of the proximating tooth, thus smoothing the surface of the gold. Another saw, with the blade upside down in the frame, should then be carried through the previous cut and down between the free margin of the gum and the tooth until its upper toothed edge is to the gingival of the gold that overlaps the gingival margin. By sawing in the occlusal direction, this overlap is quickly removed. Then with finishing knives and files the gingival portion of the filling, as well as the buccal and lingual margins, may be trimmed smooth. With a file the occlusal portion of the proximal surface may be rounded. Then disks may be used on the buccal and lingual, but these should not reach into the embrasure as far as the position of the contact point. Narrow strips, coarse, medium and fine, may be used to polish the gingival portion, and finally a wide medium, followed by a wide fine strip, should be passed over the contact. If this is done after the trimming and polishing of the remainder of the filling, these strips will leave the contact properly rounded.

In cases where the filling extends so far to the gingival that it is impossible to saw off the excess of gold at the gingival with the reverse saw, this excess may be removed with the finishing files and knives either before or after the separator is removed. It is sometimes easiest to finish all of the proximal portion of the filling except the gingival while the separator is in place and the gingival portion after the separator is removed.

The Assistant in Gold Filling.—I cannot emphasize too strongly the value of a well-trained assistant in gold filling operations. There are almost innumerable difficulties that are made easy by the

assistant. There is no operation in which an operator oftener wishes for three hands, and with a good assistant he has four. I think most fillings can be put in better and in at least a third less time. It takes but a few weeks to train a young lady of average intelligence and ability to mallet, pass gold from the annealer into the cavity, to hold a mirror or an instrument, and many other little things, and it is a continual surprise to me that so few men employ assistants. If I used an assistant for no other purpose than her help in placing gold fillings, I am sure her services would be worth while in making these operations easier for my patients, in making them easier for me, and at the same time enable me to make better fillings; in fact, enable me to make many fillings that I would not attempt without an assistant; and not only to make better fillings, but save much time in doing so. Time is money to every busy man.—*Dental Brief.*

CONSTRUCTION OF PORCELAIN CROWNS WITHOUT MODELS. By Henry H. Thompson, D.D.S., Utica, N. Y. However desirable bands may be in making extended bridges, there certainly is no good reason for their use in connection with one-piece construction. It is much better to rely for strength upon a properly shaped post of sufficient size than to subject the patient to the pain usually caused in reversing the bevel of the root, in order to properly fit the band. So far as the protection of the root is concerned, it does not need a band for that purpose any more than its neighbor needs one, and in the event of the root decaying, at some subsequent time, it is to be treated exactly as though it carried a natural crown instead of a porcelain one.

It is also unnecessary to suggest the many advantages which porcelain crowns possess. Properly constructed, they are very strong. The freedom from irritation and the translucency of the porcelain make it possible to insert them in such a manner that they will often defy detection even by the most experienced eye, a result which can only be approximated with any form of crown which has gold for a background.

There appear to be about three classes of porcelain crowns in use today. First, those which come to us ready-made, like the Davis, Logan, Justi, Brewster and others. Second, those in which a long pin facing is used and subsequently backed up with porcelain.

Third, those built entirely from porcelain bodies made up in the office by bold and fearless operators.

For a few moments let us consider the defects and shortcomings of some of the present productions. In Fig. 1 I have tried to illustrate one of the most serious defects in all ready-made crowns. It consists in the fact that in all cases where there is a deep festoon of the gum, the neck, or the gum lap, of the ready-made crown is altogether too short, and we are confronted with the space indicated at point (*a*). While there are many methods in vogue today for making a perfect joint between the root and the crown, some of them being reasonably good, the fact still remains that the majority of them require comparatively sound and well shaped

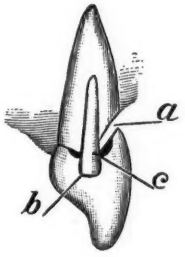


FIG. 1.

roots. This class of crowns is also exceedingly limited in its range of adaptation; little provision is made for meeting the requirements of roots of abnormal size or shape, and an operator has very little latitude in which to produce artistic effects in posing them so that they will reproduce the slight irregularities so common in the natural teeth.

There are comparatively few operators who have had sufficient experience to enable them to successfully produce crowns of the third class for the anterior teeth. It requires too much time and skill to produce the delicate shadings and we shall, therefore, find it greatly to our advantage to employ some form of class two, and use the facings furnished us by the manufacturers in endless varieties of sizes, shapes and colors. We are told that these crowns are weak, that the porcelain which is fused on the backs of the facings chips off and leaves the platinum pins exposed; this leads to the popular fallacy that porcelain cannot be fused by the operator as

well as by the manufacturer, and this theory is further supported by the fact that the ready-made crowns seldom break unless they are materially weakened by grinding in the process of adaptation. To my mind, this does not prove anything of the kind. It must be granted that a man who is doing any one thing constantly will probably do it a little better than someone who only does it occasionally; aside from this the manufacturer has no advantage over us. Porcelain will yield satisfactory results to any earnest student. With our present furnaces and pyrometers there is no reason why this material cannot be fused by the operator in his laboratory as well as anywhere else or by anybody else. It is still further

FIG. 2.

FIG. 3.

claimed that the manufacturers pack their porcelain in molds under heavy pressure and that we cannot do this, therefore we cannot produce the same results. I suspect this is also incorrect, for the porcelain, after having been packed in the molds, is removed and taken to the furnace and there is no pressure of any kind whatsoever upon the porcelain at the time of baking. Porcelain when manipulated in the laboratory should be worked very wet instead of very dry, and while it will probably shrink a little more than when packed under pressure, the finished product will be the same. They both shrink, and in doing so take their natural molecular relation—and that is all there is to it.

I have here two samples of porcelain which were originally fused as one piece and subsequently cut apart. They contain considerably more porcelain than would ordinarily be used in a single crown, yet an examination will show that they are fused fully as well as the average product of the manufacturer. In grinding through a num-

ber of facings, it is surprising to find what a large percentage of them are more or less defective. The porcelain in the samples was simply mixed with water and poured out into my hand and rolled together as the water was drying out. These specimens, like those which I shall subsequently show, were baked by my office assistant and are the first and only specimens prepared for this meeting. In other words, they were not picked out from a larger number as being the best. They represent the average work which can be done at any time.

Granting that porcelain can be satisfactorily fused in the laboratory, what then is the trouble with this class of crowns? It is not

FIG. 4.

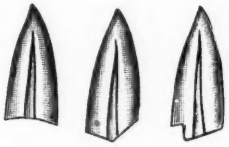


FIG. 5.

necessary to go far to discover causes which often lead to failure. For the purpose of study I have reproduced (in Figs. 2 and 3.), as nearly as possible, illustrations taken from publications from authors of some note. They are expert porcelain workers, but as they are not here to defend themselves, I will not mention names. One represents the construction of a central incisor, the other that of a bicuspid. Remembering that porcelain owes its strength to its bulk, we see at first glance that the metal is far in excess of the demand and that it becomes an element of weakness instead of strength. Another exceedingly important thing to remember is that porcelain cannot be perfectly baked, in large quantities, between two fixed points. In Fig. 2 the pins have been soldered to the post and the facing becomes one fixed point and the post another fixed point. In fusing large quantities, the porcelain will adhere to the post and shrink away from the facing, or it will adhere partially to both and leave a bad fracture between them. If I were to complete the bi-

cuspid crown, I should want to add substantially all the porcelain in one bake, and it would never fuse in the world without being very defective between the two platinum posts. To illustrate this, I have here a sample (Fig. 4) which is slightly exaggerated, but fully shows what takes place to a greater or less degree every time an attempt is made to fuse a large quantity of porcelain between fixed points. You notice that the porcelain is badly fractured, and if an attempt is made to fill it in at a subsequent bake, it is very questionable how satisfactorily it can be done; the walls of the fracture continue to make two fixed points and must be regarded as an element of weakness.

In order to be strong, a crown must be constructed in such a manner that there will be no space between the post and the facing

FIG. 6.

FIG. 7.

(as shown in Fig. 2), for the porcelain in shrinking will be obstructed by the post and stop there, instead of going in a mass and uniting perfectly with the facing. The only exception to this rule that I know of is when Jenkins Prosthetic Porcelain is used. That seems to have a flowing quality and will settle down and fill the intervening space, but this porcelain lacks good carving qualities and is totally devoid of a necessary setting quality which I will hereafter mention, and is therefore eliminated from consideration—as the old darkey said, "We will dispense without it."

We need a crown which can be adapted to roots of any size and shape, whether decayed or not; which can be posed in any position; which possesses strength and beauty; and which can also be constructed in a reasonable length of time, without the use of models. This brings us to the topic of the evening.

In order to present what I desire I will start at the foundation, which, of course, is the preparation of the root. As illustrated in Fig. 5, the individual operator may exercise his own pleasure in regard to the shaping of the root. It may be made concave, with double bevel, or with step. Inasmuch as the double bevel is probably

used by the great majority of operators we will accept that as our standard for consideration.

In order to conceal a metallic base the labial face of the root should be ground well underneath the gum. There are a great many root facers on the market today, but I have found nothing so convenient as a small mounted carborundum stone, No. 19, made by the White Company. It is small enough to be held firmly, and it cuts rapidly. After the root has been ground to the gum margin, with the ordinary stump stone, it takes only a short time to carry it underneath the margin to the desired depth.

At this point I wish to suggest an important change which will

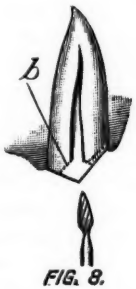


FIG. 8.

FIG. 9.

FIG. 10.

be found very convenient when the adjustment of the facing is made. Instead of leaving the face of the root flat as has been the custom for years, I would employ the principle suggested by the "ball and socket joint," and hollow the labial face of the root and give it something of a saucer shape. This can readily be accomplished with the same little carborundum stone. After it has been carried back and forth across the face of the root something on the order of a plane, as already mentioned (Fig. 6), the edge usually becomes dull and somewhat rounded, and by simply tipping the handpiece up and running the edge in contact with the root the effect can be produced which is illustrated (in Fig 7).

In order to facilitate the making of the cap, I would also suggest another change in the preparation of the root. It consists in cutting a groove or seat which will prevent the metal from turning while it is being conformed to the shape of the root. This is done with an instrument as illustrated in Fig. 8. It being difficult to

describe this formation, I have prepared a large model (Fig.9), which will show better what I mean.

Now we will consider the subject of posts. It is a matter of vital importance in connection with bandless crowns. All crowns of the Logan type are subject to the criticism that the posts are the strongest at point *b* (Fig. 1), whereas the strength should be at point *c*. Remembering that porcelain depends upon its bulk for strength, the post should decrease in size as it protrudes into the crown instead of increasing, and should occupy as little space as is consistent with the requirement of strength. A friend has called my attention to the fact that a post which has the same diameter throughout its entire length is much harder to withdraw than one which is tapered, and it is therefore desirable to adopt this principle as far as possible in making the post. They are made from square, iridioplatinum wire, gauges Nos. 14 and 16 being the ones most frequently used, and Fig. 10 represents about the proportionate size a post should bear to the rest of the tooth.

Today there are a great many different methods for making the cap, or, if desired, cap and half-band. With the aid of the little seat I have suggested, the making of the cap is such a simple matter that there is little use for the countless devices now on the market for swaging a metal cap. The post having been prepared, the next step is to take a strip of platinum, about No. 36 gauge, wide enough to cover the root and of sufficient length to be readily held in the thumb and forefinger of the left hand, while, with a suitable instrument, it is burnished or spun into the seat already mentioned. At this time not the slightest attention is paid to conforming the metal to the rest of the root. Now remove the platinum and cut it to about the length which will be required. Replace it on the root, and while in position, make a small incision through the platinum directly over the post hole; grasp the post firmly in a small pair of forceps, push it through the incision directly to place. If this is carefully done the cap and post can be removed together without waxing, and taken to the furnace and soldered without investment. Twenty-five per cent platinum solder should be used. After soldering, it is returned to the root, and it is a comparatively easy matter to force the metal to conform closely to the face of the root, either with the use of burnishers or with a small pine stick and mallet. As soon as the outline of the root begins to show the extra

platinum is cut off. A small pair of chiropodist's scissors will be found most excellent for this purpose.

If the root has been carefully prepared in the manner described, the gum should be wounded only to a very slight degree, and the fitting of this cap is ordinarily not a painful matter, but if desired, cocain hydrochlorid may be used for extremely sensitive patients. It will sometimes be found that the gum is a little inclined to drop down over the root and is not readily forced back. In all such instances a pellet of cotton saturated with adrenalin chlorid may be used to advantage in pushing the gum away, the patient holding it there while other preparations are being made. It will surprise

FIG. 11.

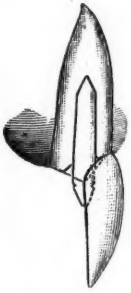


FIG. 12.

FIG. 13.

one who has not tried it, to see how far a gum can be pushed back, with the aid of this agent, in five or ten minutes. I might also mention, in passing, that the adrenalin chlorid may be used to paint the gum, with very gratifying results, in all cases of pericemental inflammation which we have become accustomed to treating with tincture of belladonna and tincture of iodin.

To return to our topic, we will now consider the adjustment of the facing. It is always a great advantage to make selections from the product of manufacturers who use extremely high-fusing porcelain, as they will not change color in subsequent baking. It is also important to have those which are exactly the right size. The facings are all carved by artists and extensive grinding destroys their proportions and materially lessens the artistic effect of the finished crowns. Therefore, at the preliminary examination and before the remnants of the natural crown have been cut off, it is a wise precaution to be sure that we have a suitable facing for the

case in hand. A small pair of draftsman's dividers—about three inches long—will be found a convenient instrument with which to actually measure the length and breadth of a facing and the space it is to occupy.

Having made the selection, grasp the facing by one of the pins with a strong pair of pliers, carry the facing to position on the root, and do whatever grinding may be necessary to adapt the facing to the root. The advantage of the "ball and socket" preparation of the root will now become evident, as the facing can be turned in any position desired without opening the joint. After the facing has been ground so as to occupy the proper position as related to

FIG. 14.

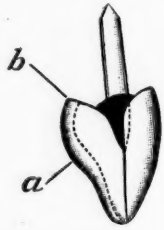


FIG. 15.

FIG. 16.

the other teeth, cut the platinum pins off and grind them out a little below the surface of the porcelain and also remove the glaze from the back of the facing. Now place the cap and post on the root and carry the facing to place, holding it in actual contact with the cap and post with the index finger of the left hand. The occlusion is now noted. In a vast majority of cases it will be found that the facing will stand out too far in the mouth and a groove must be cut in the back of the facing (Fig. 11) in order to accommodate the post (Fig. 12). On the contrary, if it is found that the facing does not stand out far enough when held in contact with the post, the first thing to do is to bake a quantity of fresh porcelain on the back of the facing (Fig. 13), after which the facing is again brought to the mouth and the new porcelain is ground until the facing will occupy its proper position when held in contact with the post. This work should be done carefully, so that in the next step the facing will have a definite seat to which to go.

We are now ready to fasten the facing to the post. This is accomplished by taking advantage of a certain "setting quality" which is found in medium fusing porcelain. It is an inherent quality of this preparation, and is due to the kind of clay used in its manufacture and the method of incorporating the flux. There is no admixture of any substance like starch or gum tragacanth. It is a very workable material, and will withstand considerable handling and permits extensive carving, which other grades of porcelain will not allow. It also can be readily ground and polished after it has been glazed. It seems to me that the profession has overlooked many desirable features in this production, and is making the manipulation of porcelain a task rather than a pleasure.

At this point the labial face of the cap is varnished with a thin

FIG. 17.

FIG. 18.

solution of shellac, so that when the fresh porcelain is added it will not adhere to the platinum in fusing, but will unite with the facing and the very slight crevice which is left can be filled in at the next baking.

Now, the trick consists in uniting the facing with the post, and making the adjustment in the mouth. It is done by placing a small quantity of freshly mixed porcelain on the back of the facing, carrying the facing to place on the cap and post, and simply holding it there with the left hand for a short time, until the porcelain dries out and "sets." This setting can be greatly hastened by adding a little dry porcelain. A Reeves carver is a convenient instrument with which to do it. Moisten the tip of the carver, dip it in the dry porcelain and with it dry out the moisture in the porcelain on the back of the facing. This whole operation takes less than two min-

utes, and it will surprise one to see how firmly the facing will be held on the post. It can be readily handled and the excess of porcelain can be brushed from the cap. Only enough porcelain should be used to engage the sides of the post and be flush with its lingual surface, and none should be allowed to extend over the lingual face of the cap. This is then carried to the furnace and baked (Fig. 14).

At the next baking, it is expected that substantially all the porcelain needed to complete the crown will be added. In connection with this there are two important things to remember:- First, shellac the metallic base, so that in the process of fusing the porcelain will not adhere to and drag on the platinum, but will unite with the facing in one homogeneous mass; second, in adding the fresh porcelain,

FIG. 19.

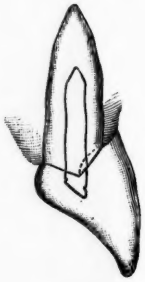


FIG. 20.

always make a wet union—the wetter the better. One is materially aided in this work by holding a small strip of newspaper around the crown. A convenient quantity of porcelain, mixed to the consistency of thick cream, is now poured in. When it becomes a little unmanageable, add dry porcelain to stiffen it. Continue to add wet porcelain and dry it out until a sufficient quantity has been placed in position. When in a semiplastic state, remove the paper and with the fingers the porcelain can be readily patted into any desired shape, remembering that the bulk must be much in excess of what is desired in the finished product (see Fig. 15-*a*). If it is subsequently found that at any point there is not sufficient porcelain, moisten that particular spot by carrying a small quantity of water to it with a camel's hair brush and quickly add fresh porcelain. This will make a wet union and the slight additional moisture will be quickly ab-

sorbed by the bulk of porcelain without its shape breaking down. The working quality of this particular porcelain is remarkable, and in a short time one will develop considerable skill in its manipulation. The crown is now put in the furnace and brought to a good biscuit bake. At this time the excess of porcelain, if any, is ground off, and the crown given the exact shape which is desired, the occlusion, of course, being one of the principal features to consider.

When the porcelain was being built up no particular effort was made to produce a smooth surface, as it is found much more advantageous to wait until it is biscuited and produce that effect by going over the work with a sand-paper disk. If, in building up the porcelain, it is carried well out (as shown at point *b*, Fig. 15), it is often unnecessary to add any more porcelain. However, if it should shrink away a little at that point, this space should now be filled in and the work given its final glaze. Work finished in this manner will have a beautiful surface, and one can scarcely tell where the new porcelain begins and the old leaves off. Crowns for bicuspids can be constructed in exactly the same manner, it being necessary only to make a few changes in matters of detail. When the particular tooth to be crowned has one root, enlarge the canal in such a manner that the post can be diverted from the center and thrown into the buccal cusp, or bend the post at neck, accomplishing the same purpose. In the event of the tooth having two roots make a single post crown, placing the post in the buccal root, provided it is large enough to accommodate a strong post; ignore the other root so far as the construction of the crown is concerned. If the roots are small and it is deemed wise to use two posts, make a good groove or seat between the post holes. In making the metallic base, force it into this groove and then fill it with platinum solder, thus firmly uniting the two posts. Cut off the lingual post flush with the cap, allowing only one post for the attachment of the porcelain, and that in the buccal cusp, because it is the larger. In building up the crown simply be sure to get on enough porcelain to fill the approximal spaces and secure occlusion. After it has been biscuited, grind to proper approximal contact and occlusion.

The possibilities of this crown are almost limitless. Fig. 16 is a finished crown. Fig. 17 is simply a novelty; the crown carries gum enamel and shows to what extent restoration can be readily made.

Fig. 18 is a reproduction of a case in practice. It is constructed

in the same manner. Both facings were adjusted in the mouth at the same time and fused without investment of any kind.

Figs. 19 and 20 are intended to illustrate the correction of irregularities in patients of mature years; the facing in Fig. 20 having been carried considerably in advance of the root outline, and shaped at the neck to conform to the contour of the gum.—*Items of Interest.*

DENTISTRY: ITS RELATION TO HEALTH. By R. W. Rule, D.D.S., Oakland, Cal. Many times we have discussed the subject of dentistry in its relation to the health of our patients, and not infrequently we have seen even the most ordinary operations in dentistry result in benefits to the general health which are of no small consequence to the recipients of our services.

But comparatively little can be found in our literature as to the effect which the daily duties of the dental operator have upon his own health. It is to this phase of the question that I desire to devote this little paper, in the hope that some thought may be brought out which may be of possible benefit to my fellow-practitioners, and, perhaps, more especially to the younger members of the profession. There is little question that the great majority of those who take up the study of dentistry as a life-work do so with scarce any regard to their fitness for it, either mentally or physically. Perhaps no thought is taken as to whether they are endowed with the natural talents which will enable them to attain true success. Few may be said to have previously obtained any accurate knowledge as to what they will be called upon to undergo during the period of preparing themselves for their calling, the years of tedious climbing, or in the everyday routine of a busy practice, once such is attained.

Ask the members of the senior class in one of our colleges if their ideas of dentistry have changed at all since they took up the work. Many will tell you that, had they known what was before them at the beginning of their course, they would never have entered the field. But their thought now is, It will soon be clear sailing—most of the hard work is past. Is it?

Ask your brother practitioner what led him to take up dentistry. He will very likely say to you: Oh, my parents used to have to pay big dental bills, and thought that dentists made easy money

and lots of it, so they concluded it would be a good profession for me, and sent me to college.

You will say to me, This is foreign to your subject. But the thought I wish to bring out is this: That entering the work blindly—ignorant of what its demands are to be—simple laws of hygiene are neglected; nerve force, which should be carefully conserved, is needlessly expended, and sooner or later the day comes when one is brought face to face with the fact that there is a limit to his vitality.

Statistics show that the average age limit of dentists is about forty-seven years, and that it is well down toward the bottom of the list. Many start out with a strong constitution and a superabundance of vitality, and may continue in the work even at a busy practice for years before becoming aware of the effect that it has had upon the system. Others with less strength to begin with, and with surroundings less favorable to conserving their nerve force, have more quickly used up their reserve, and are made to realize that they are actually engaged in hard work. Those of you who have been practicing for a number of years will not likely dispute the statement that dentistry, as the average dental practice is conducted, is wearing to a marked degree upon the health, and, if the statistics which I have just cited are to be relied upon, it is so to the extent of causing the premature death of many of those who are engaged in this noble calling.

Let us inquire into some of the reasons why this is so, and I would have it understood that reference is had to the careful, conscientious operator—the one who is capable, not necessarily of displaying, but of feeling sympathy for his patients, of entering, as it were, into their sufferings and feelings of discomfort.

The most important cause will doubtless be found in the nervous strain to which the operator is more or less constantly subjected during the course of the day's work at the chair, and which is due principally to three things:

First, the fact that many of our patients are nervous persons, that many more who are not what would ordinarily be called nervous are so when they come for dental operations, and that the great majority of them are in constant dread of being hurt; thus the sympathetic operator is continually on the *qui vive* to keep from causing his patient any unnecessary pain, and the nervous strain of

this upon the operator is often equal to if not greater than the strain upon the patient, who endures it but for an hour, while the operator is called upon to go through it hour after hour, day in and day out.

Secondly, there is the necessity in every well-conducted practice of the operator adjusting himself to the various temperaments of his patients, and this, when it is carefully considered, will prove to be an item of no small consequence. During the course of the day one will see from half a dozen to a dozen patients or more, each one of a different type temperamentally, and ranging all the way from the hurried business man, whose words are few and his time valuable, down to the timid, overworked, neurasthenic schoolgirl, who comes most often at the last hour of the day, when the operator's best energies are spent and he is sometimes in poor condition for dealing with this class of patient; she, however, if tactfully handled and carefully treated, is sometimes more easily managed than the nervous, sickly woman, who has little strength and less fortitude, and whose mind is unnecessarily instilled with fear and dread. The tactful handling of these and the many other different types of patients we have to deal with requires the cultivation of a versatility of temperament and the daily expenditure of a good deal of nerve force, since one must adjust himself to the different individualities in such a way as to gain the confidence and to exercise the greatest influence for good, at the same time not giving up one's own personality.

We come now to the question of position at the chair, a difficult one to solve satisfactorily, and one which should claim the attention of us all. I think it will be generally conceded that the best position to assume at the chair is to stand behind and a little to the right of the patient, looking down at our work, and using the mouth mirror to reflect the image of the tooth or cavity we are working upon. Much of our work can be done from this position, but on the other hand there is much of it that requires one to change the position so that the weight is thrown on to the right foot, the heel of the left foot being raised from the floor, and the body bent to the right while the head is turned to the left. This brings the spine into a position of lateral curvature, with rotation from right to left, while the left innominate bone and the left shoulder are raised. In time, this will produce a permanent condi-

tion of curvature and rotation of the spine, and will also cause the left hip and shoulder to be higher than the right. This is what would be called occupation curvature, and I believe that it will be found in 100 per cent of cases of men who have been practicing for a period of five to ten years or longer. It is also found to exist, though in a less degree, in a large percentage of barbers. It can be overcome by a more or less lengthy course of osteopathic treatment, but so long as the cause continues we will go back to the same conditions.

In itself it is not specially serious, as it will not often prove to be the cause of trouble. The trouble, however, lies in the fact that any position which we may take in operating at the chair, and some more so than others, is a strain on the nerve centers of the back, besides causing pressure on the liver, kidneys, etc., which in cases may prove serious.

So far as I know, there is no way of obviating this evil entirely, though most operators might lessen it materially by giving a little thought to the subject and endeavoring to assume more nearly correct positions while operating. The aim should be to throw the weight of the body mainly on the balls of the feet, and to distribute it as nearly as possible between the two feet—at times resting a knee or an elbow against the chair to balance if necessary.

It is well also to cultivate the habit of working from the left side of the chair when it can be done conveniently. Working from in front of the patient should be avoided as much as possible, and leaning upon or resting the elbows upon the patient should be utterly discountenanced.

Other matters of importance in connection with the subject we are dealing with are close confinement, the breathing of contaminated air from the carbon dioxid and other impurities exhaled by the patient, constant close attention required by many parts of the work, with which is associated much eye strain, etc. I have not attempted to give these in the order of their importance, but will consider each in turn.

I shall not go into the question of contracting diseases by infection, such as syphilis, blood poisoning, etc., as it is scarcely within the range of my paper, besides its having been dealt with many times in our current literature.

In regard to the matter of confinement, many operators are

in the habit of spending from eight to ten hours a day at their work, and this, not infrequently, seven days in the week. And right here let me say that, considering it purely from a health standpoint, no man should make a practice of working seven days in the week; far better let it be five or five and a half. On this I make no further comment, but return to the number of hours. Considering the nature of the work, and its wearing effect upon the system, unquestionably the hours above mentioned are too long to spend daily at the chair. The man who limits himself to five or six hours a day will do his work more easily and at a less expense to his vitality—will better serve the interests of his patients, and in the long run will do more work and make more money than the one who day after day draws heavily on his reserve force, forgetting, or perhaps not realizing, that to this there is a limit. Necessarily our work is more or less confining while we are at it, and the best we can do is to shorten the hours and endeavor to spend more time in the open air at either or both ends of the day; and, indeed, a practice which is becoming more or less common, and which cannot be too highly recommended, is that of sleeping out of doors. The importance of fresh air at night, and as much as possible in the daytime, cannot be overestimated. This leads us to the question of breathing the air that has been exhaled by our patients.

Even if the breath of our patients was always sweet, we know well the deleterious effect of rebreathing the carbon dioxid that has been thrown off from the lungs, deprived as it is of the oxygen which we need, and loaded instead with the impurities which we desire to get rid of instead of taking into our own lungs. But, in addition to this, there is the fact that a large percentage of our patients have foul breaths—and some of them very foul—from one or more of the various causes, such as carious teeth, decayed and decaying foodstuffs between and about the teeth, catarrhal conditions of the nose and throat, disordered stomachs, constipation, stale beer, etc. In cases where the conditions causing the foul odor lie mostly in the mouth, a deodorant mouth wash, such as potassium permanganate, may be used to overcome it. Oftentimes the use of the rubber dam, by forcing the patient to breathe through the nose, will materially help matters. During most of our work it is possible to stand above the patient in such a way as not to get his breath directly in our faces, though this is not always possible,

and do as we may, we cannot get away from the fact that the air which we breathe is more or less contaminated by the breath of our patients. Great care should be taken that the office is thoroughly ventilated. If possible, one or more windows should be kept open constantly. The first thing in the morning the windows should be thrown wide open, and if the weather is mild and not too windy, they may be left open all day. If it is necessary to have the windows closed to keep the room comfortable, they should be opened at intervals during the day to thoroughly air the room.

I shall enter but briefly into the subject of eye strain, since it has been dealt with by others in a more comprehensive manner than I would be able to handle it, and my paper is already long enough. The close application to detail required in most of our work, along with the fact that it is difficult or impossible to get a good light on much of it, such as work on the posterior teeth, and particularly root canal work, also the long-continued focusing of the eyes at close range on gold work, sometimes producing what is known as gold blindness, are accountable for the fact that a very large percentage of dentists are required to wear glasses at an early age. Working by reflection in the mirror also causes a greater strain on the eyes than direct vision. Not only will the effect of this be felt on the eyes themselves, but often there will be reflexes to the pneumogastric, with a train of various symptoms which may be very distressing at times. Every effort should be made to see that the light is the best that can be obtained; not that the light in the whole room should be strong, but that it should be concentrated on the work. There should be no cross lights, and if the window extends low down, the lower part of it should be covered by a shade drawn up from the bottom. A north light is generally considered the best for operating, though some who may be classed as authorities on the subject claim that the east light is the best. It is certainly a strong advantage to have the warmth and brightness and cheer of the south sun in the winter time, though a south light is not so good to work by, and, if used, the window should have a white linen shade, which may be drawn during the period of the day when the direct sunlight shining in would interfere with the operating.

The color of the walls should be one that will soften the light and rest the eyes when we look up from the work. For this purpose green will prove one of the best. We all know the restful

effect of the green grass and trees in nature, and how it softens the glaring light of the sun on a bright day.

Working after dusk or by artificial light should be avoided except in cases of necessity. The eyes should be carefully tested at intervals, and when necessary properly fitted glasses should be worn.

To sum up, there are many factors which have a bearing on the subject before us. Every occupation has its advantages and disadvantages, and dentistry, from a health standpoint, seems to have more than its share of disadvantages. Most of these are of such a nature that they cannot be overcome, though with some thoughtful care they may be lessened.

In closing, allow me to call your attention for a moment to the question of exercise, diet, etc. There is nothing that will enable one to control the nervous system so well as a strong, healthy, muscular physique. With a simple, properly selected diet to furnish good healthy blood, enough systematic exercise to keep this blood in active circulation, and pure air to supply us with an abundance of oxygen, we have the best conditions for building vitality.

For one who is in a run-down condition, large quantities of milk taken in addition to the other foods or as an exclusive diet used in the manner known as the forced feeding method, will be found very efficacious in making good blood, which must be at the back of every building up process. Eggs also, by virtue of the lecithin contained in them, have proven themselves to be an excellent food for supplying nerve force.

Exercises taken by those engaged in an occupation requiring the expenditure of so much nervous energy as ours does should not be too violent, as they would further deplete the energy, and by so doing defeat the end which we desire them to aid us in accomplishing. The exercises which will be most beneficial are those of a recreative nature—the ones which appeal most strongly to the tastes of the individuals.

Walking, horseback riding, golf, gardening, etc., also, if taken in moderation, wheeling, boating, swimming, running, light gymnasium work, tennis playing and mountain climbing, are good and healthful exercises. Close your office early enough to allow yourself an hour's time for exercise in the open air before dinner. It will freshen you up after the day's work and make you more con-

genial for the evening at home, instead of feeling cross and irritable. You will sleep better, too, and let it be remembered that the recuperating of nerve force requires much more sleep than the resting of the muscles. From eight to ten hours will be necessary in most cases to keep up the nerve force—and do not forget either that it is much easier to get behind than it is to catch up and get ahead.—*Pacific Dental Gazette.*

CASTING A GOLD COPE FOR DETACHED POST CROWNS. By Arthur G. Smith, D.M.D., Peoria, Ill. Perhaps no operation that is done by the dentist of average skill has produced more pleasure and satisfaction to the patient (at the time of its performance) than that of cutting off a badly decayed and broken down anterior tooth and substituting therefor a detached post crown of some standard manufacture. The reasons for this are several: The operation is neither tedious nor painful; it is performed without the use of the hated "rubber dam;" the cost is not excessive and the result, judged from the ocular standpoint of the patient, is a tooth that looks "as good as new."

So much for the bright side of the picture. Those who have done these operations know what is on the back of the canvas. They know of the utter inability of anybody to make a perfect joint directly between porcelain and root end by any possible process of grinding. They also know of roots that have split from end to end like pieces of straight grained pine, of decay that creeps in at the cervical margin, causing a leak that makes it necessary to begin a series of half-hearted and half-done patch-work operations with cement or that friend of the last ditch, guttapercha! I need go no further into the dismal picture. All too well are the weak points of this particular operation known to every intelligent dentist.

For the elimination of these glaring defects that have heretofore inhered in this operation of the "ready to set" porcelain crown, I offer the following plan of operative procedure: Fill root canal and enlarge it for reception of post supplied with crown, quite in the usual manner. If end of root is sound grind it carefully and evenly just under the gingival margin. If at any point decay extends rootwise under the gum, excavate thoroughly with a sharp bur. The resulting inequality in the end of the root will be perfectly taken care of when the cope is made. Now grind the porcelain

crown to an approximate fit (I pass over the fact that no man ever ground a porcelain crown to any other kind of a fit on a tooth root, no matter what he may have thought he was accomplishing at the time he did the work). See that the post is left sufficiently long to prevent the crown from quite touching the end of the root at any point. Let the space between porcelain and root end be from ½ to 1 millimeter (or say the thickness of a card or piece of blotting paper). Lay crown and post aside and take a small piece of warm inlay wax, and without drying the parts, press it gently against the end of the root. Hold it lightly in position with the left hand and with the right steadily press post and crown to position, of course forcing the post entirely through the wax and up the enlarged root canal and pressing the base of the crown into the soft wax. As a result of this step the wax will be spread out in a somewhat irregular ring all about the gingival margin and base of the crown. Now while the wax is still soft and mobile make sure that position, alignment and occlusion of crown are all exactly as you want them in the finished work, then chill the wax and with a small sharp lancet trim away most of its excess from root end and crown base. Now remove crown only, leaving wax and post in position, and while they are thus in position, take a small warm burnisher or other instrument and melt the wax immediately around the post so as to tack wax and post together, replace crown and press firmly to exact position to prove that there has been no distortion of the wax as a whole. Then again remove crown and chill the wax. Now grasp protuding end of post firmly with pliers and by a straight pull bring away post and wax together without distortion or disturbing their relations. Now thoroughly chill the wax cope, and holding the root end of the post in the left hand, with crown end of post pointing upward, drop the porcelain crown in position on the wax cope. If the work has been carefully done the base of crown will fit the cope exactly at every point. If it fails to do this, take a new piece of wax and begin all over again, as there will probably not be wax enough now left in the imperfect cope to make a proper fit.

Now comes the nicest part of the whole procedure, for with the crown in position on the wax cope, you can grasp crown and post firmly between thumb and finger of the left hand, letting occlusal edge of crown rest on thumb and tip of post against first finger. The final trimming of the wax cope can now be done in a moment's

time and with perfect ease and safety, as the outline of the root shows plainly in the upper part of the wax (showing exactly where to trim on the root side) and the crown itself in position stiffens the wax and also prevents any possible excess of trimming on the crown side. Needless to say, however, this final trimming of the wax cope to exact shape should be done with the utmost care and a sharp lancet, while the cutting strokes should be toward the porcelain rather than away from it. It remains now only to lay aside the porcelain crown (don't remove the post from the wax) and attach a sprue wire at the most convenient point on the wax and proceed with the investment and casting exactly as for a regular gold inlay. After casting, the cope will require almost no further work save cutting off the sprue, and when crown and finished cope are placed in position on the root, they will be found to fit absolutely and to be perfectly rigid and immovable in the identical position and relation to surrounding parts that they were intended to occupy. Cement to place as usual.

This method of crowning has many good points. It enables a man of ordinary ability to obtain an extraordinarily good result. It increases neither the time of the operation nor its discomfort to the patient. An irregularly shaped or partially decayed root is crowned with almost the same ease as one sound and regular. There is no band to break the continuity of the root surface and cause recession and irritation of the gum margin, yet the root is protected against both decay and fracture in a way hardly possible by any other method and that without showing more than a line of gold. Finally, if the porcelain is accidentally shattered the root with its heavy solid gold cope is ready to receive a new porcelain superstructure at a minimum of trouble to the dentist or expense to the patient.—*Dental Review.*

METHODS OF COMBINING COHESIVE WITH NON-COHESIVE GOLD OR WITH TIN, AND TIN WITH NON-COHESIVE GOLD. By L. G. Noel, D.D.S., Nashville, Tenn. A sufficient separation is of the utmost importance in the treatment of all approximal cavities. In some cases where the destruction of tissue by caries has not been great, and where the teeth yield readily to the pressure of a separator, the necessary space may be obtained at once by one of the instruments devised for this pur-

pose; but in a large proportion of cases the tissues are hard and resistant, requiring the use of such methods as will set up sufficient hyperemia in the pericemental membrane to lift the teeth slightly in their sockets, when their crowns may be forced apart.

For the accomplishment of this end it is my custom to commence with thin separating rubber, and after this has been worn twenty-four hours it is changed to wedges of soft wood. White pine or cottonwood, compressed in polished pliers after the wedge has been shaped, will do well in many cases, but with some patients, whose tissues are very hard and unyielding, I prefer the orangewood wedges. When I resort to this method I prefer to take a week or ten days to gain the required space, for by that time not only is ample space gained, but the teeth will not be painful to pressure.

In my opinion, the best and quickest method of separating the bicuspid and molar teeth is as follows: Apply the rubber dam and Perry separator, press the teeth apart sufficiently in order to obtain a good idea of the location and extent of the cavities, then open them from the occlusal surfaces with round or cross-cut fissure burs, and force a tight wad of cotton previously saturated with phenolized resin into the cavities between the teeth.

The separator and the rubber dam may now be removed, and the excavation of the cavities deferred to another day, when it will be found that the swelling of the cotton has separated the teeth sufficiently to insure satisfactory work.

I shall divide the cavities usually filled with combinations of cohesive gold and non-cohesive materials into five classes, as follows:

(1) Cavities between the incisors and cuspids.

(2) Approximal cavities between the cuspids and first bicuspids.

(3) Approximal cavities between bicuspids and molars.

(4) Cavities on the occlusal surfaces of molars and bicuspids, complicated with cavities on the approximal surfaces.

(5) Cavities on the buccal surfaces of molars, including those complicated with cavities on their occlusal surfaces.

It will be observed that I omit all cavities best suited to porcelain, or to strictly cohesive gold, as it is my purpose to confine myself to those suited to the materials I am discussing.

Cavities Between the Incisors and Cuspids. In describing the preparation of cavities of the first class—those between the incisors

and cuspids—it will be understood that I include in this class all cavities complicated with cavities in the labial and lingual surfaces which might be filled with gold.

The separation having been obtained, the carious dentin should be removed with round burs until nothing but solid structure remains. The word *solid* is used to distinguish between "leathery" or totally decalcified dentin and that which is solid or partially decalcified.

Where the lingual plate of enamel is fragile it should be beveled back with chisel or stones until strong margins are obtained, and

FIG. 1 FIG. 2. FIG. 3.

when it is complicated with a cavity on the lingual surface the cavity should be followed up and all carious dentin should be carefully removed. (Fig. 1.)

The labial enamel should be conserved as much as possible, consistent with strength and durability, and the incisal angle should be left of sufficient strength to preclude the possibility of its fracturing under the ordinary stress of use. (Fig. 2.)

The gingival borders must be slightly grooved with round burs or hoes for the retention of the filling, and a slight undercut should be made at the incisal angle. This incisal retention is best obtained with hoe and hatchet excavators.

Usually the removal of the carious dentin will leave a sufficient undercut for retention purposes under the labial plate, none being required along the lingual margin.

Having removed all carious dentin and obtained sufficient undercuts, as above described, the cavity is ready to receive its smoothing and planing. This should be done with stones or with prism-shaped hoes, cutting with a planing motion and leaving no sharp angles in view along the cavity margins.

The preparations as given will apply to any pair of cavities be-

tween the upper incisors, or between the upper incisors and cuspids, but in order to fix our minds upon a particular pair of cavities, let us suppose that we are now ready to fill the mesial surfaces of the upper centrals. (Fig. 3.)

The rubber dam should always be adjusted as carefully for this combination of golds as if the purpose of the operator were to use cohesive gold only. The ligature should be applied to the necks of the teeth so as to evert the margins of the dam, and a mechanical separator should be adjusted to maintain the space and to hold the teeth firm. The labial enamel of each tooth has been slightly destroyed in the middle of the cavity, and the lingual walls have sustained much greater loss. (See Fig. 3.) For this operation the following instruments will be required: One foot plugger, one small serrated plugger with slight curve, two small, right and left corkscrew pluggers, one thin burnisher, and one pair right and left corkscrew hand pluggers.

Abbey's No. 4 (old-fashioned soft) non-cohesive gold foil should be cut into half-sheets and folded into ribbons a little wider than the greatest depth of the cavities. These ribbons are to be rolled into cylinders on a four or three-sided broach. I find a three-sided root-reamer the best instrument for rolling cylinders. The practical operator will soon learn to gage the length and size of the cylinders by the cavities to be filled, and only a few moments will be required to prepare enough gold for the case in hand.

Some tapes unrolled—some made of one-half sheets and some of thirds—should be ready at hand, also small pellets of strictly cohesive gold. At present I am using Nickold's pellets, No. ½. I find this gold very cohesive and at the same time very soft and easily worked into the non-cohesive gold.

Taking the right central first, place two or more cylinders (according to size) into the cavity, and force back their ends against the pulpal wall so that their free ends look toward the median line. The cylinders should be long enough to slightly protrude beyond the margins of the cavity so as to admit of end condensation, and all cylinders should be worked into the cavity in this manner. With the foot plugger the first layer of cylinders should be forced upward against the gingival margin, when they will spread and tighten each other, and may be malleted until the gold is driven thoroughly into the gingival groove. Usually, it is best to lay aside the foot plugger

for the small round serrated one, which is of a more suitable shape for driving the gold into the groove. Another layer of cylinders is placed in like manner and malleted to place. In building up the filling to the notch made by the destruction of the labial and lingual plates of enamel we must take care to have the cylinders of sufficient length to supply the lost structure. When the gold has been built in this manner nearly down to the cutting edge we may commence with the cohesive gold, placing it into the incisive angle in small pellets and condensing carefully with small corkscrew points under gentle mallet force.

That portion of the tooth which has been destroyed by the crumbling of the labial and lingual wall is to be restored by the con-

FIG. 4.

densation of the free ends of the long cylinders placed in this notch. But if a deficiency of gold is manifest as the condensation proceeds, cohesive foil is to be driven into the soft gold surface, by means of the delicate serrated corkscrew pluggers, until the contour is satisfactory.

The thin burnishers shown at Fig. 4 should be applied to the ends of the cylinders, in order to burnish the gold to adaptation with the margins of the cavity.

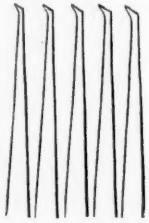
The whole filling should be gone over with the corkscrew mallet pluggers and its surface tested for soft places. Wherever one is discovered, cohesive pellets are to worked in to supply the deficiency. The cavity in the left central is to be filled in like manner, as well as any similar cavities in the anterior teeth.

Simple cavities of this class, *i. e.*, cavities not complicated by the destruction of any portion of the labial or lingual plate of enamel, may usually be better filled entirely with non-cohesive gold, but

there is no objection to working into the soft foil a few pellets of cohesive gold, at the incisal angle or at any point where the contour is deficient or insufficient.

The rubber dam should always be most carefully adjusted, and each tooth invested by the rubber should be ligated with silk, so as to tuck the dam well above the gingival margins. Thus protected the operator is always prepared to work cohesive gold into the non-cohesive foundation when requisite. In filling these simple cavities, which are usually of small or medium size, it is my custom to work the gold in the form of tapes instead of cylinders. For this purpose No. 5 Abbey's non-cohesive foil is cut into halves, thirds, and fourths, and these strips are folded into tapes of vary-

FIG. 5.



ing widths. The filling is started at the gingival margin with one of the widest tapes, made of one-half sheet of No. 4, by folding it into the cavity with a foot plugger.

The folds are placed as follows: The end of the tape is laid against the pulpal wall and kept there by means of an instrument held in the left hand of the operator. With the toe of the foot plugger a fold is carried in so that one end of each fold rests against the pulpal wall and the other overlaps the gingival margin sufficiently to allow an excess for final condensation. Fold after fold is placed in this manner until a sufficient foundation is secured, before the gold is malleted to place. The foot plugger is now used with the mallet to condense these foundation folds, and they must be driven well into the groove with a small round point. Another layer of folds is placed in like manner, allowing them to protrude slightly beyond the margin. These folds are in turn malleted down. The building up is thus continued with the foot plugger until the incisal angle is approached, and as the cavity begins to

narrow the smaller tapes are employed, these being carried to the bottom of the cavity and lodged under the incisal undercut by means of the wedge-shaped hand pluggers shown in Fig. 5.

Many operators force the last pieces of non-cohesive gold into place with these wedge-shaped instruments, going over the entire surface of the filling with them, and condensing the mass thoroughly before burnishing. The writer prefers the small corkscrew pluggers above described, under the mallet, for driving in the last piece—a small tape—at the incisal angle. These instruments are also employed for the entire surface condensation.

If during the malleting any marked deficiencies in quantity of gold are made apparent, pellets of cohesive gold are to be driven into the soft foil until the contour is complete.

The distal surface of the cuspid is considered by those who work

FIG. 6.

only cohesive gold a very difficult surface to manage; the non-cohesive worker, with conservative ideas about excavating, finds simple cavities as easy to manage here as elsewhere.

Cavities Between the Cuspids and First Bicuspids. I will describe my method of preparing and filling the distal surface of an upper cuspid, and the mesial surface of the first upper bicuspid. A satisfactory separation having been obtained, the bicuspid cavity should be opened from the occlusal surface, and if the fissure between the cusps be defective, it should be opened and carefully excavated. The opening of the bicuspid cavity will enable the operator to examine the cavity in the cuspid in order to estimate its extent and the strength of its enamel margins. In this space, as between the incisors, it is my practice to conserve the labial enamel as much as can be, consistent with strength, but the lingual enamel plate may be planed away slightly, thus giving better access to the cavity, and leaving a sloping surface such as the old non-cohesive gold workers were wont to call "the self-cleansing space." Having partially excavated the carious dentin from both cavities, the rubber dam and Perry separator should be adjusted and the teeth opened sufficiently to obtain easy access. It is not my prac-

tice to extend these cavities below the gingival margin, neither is it deemed necessary to extend them labially and lingually farther than is needed to reach good, strong enamel margins. The cavity in the cuspid should be prepared very much like those just described in the incisors. It should be grooved along the gingival margin and under the labial plate of enamel. A very slight groove may sometimes be obtained along the lingual wall in small cavities, but in case this wall is thin and weak none should be attempted, for the undercutting elsewhere will be sufficient. A slight undercut should be made at the cusp angle and the margins carefully dressed with planing instruments and tapes. This cavity is now ready for the filling. The bicuspid cavity should be grooved along the gingival margin; the labial and lingual margins will usually be

FIG. 7.

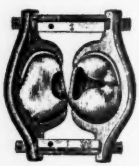
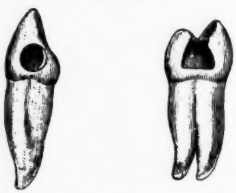


FIG. 8.



left sufficiently undercut after the removal of all carious dentin. In opening these cavities from the occlusal surface with the cross-cut fissure burs, we should be careful not to cut back the enamel and so make the opening of the cavity too wide, and weakening the occlusolingual and the occlusobuccal angles of the enamel; but just enough opening should be made to enable the operator to remove any carious dentin that may lie under the cusps. (See Fig. 6.) This fissure step should be slightly undercut with a small oval bur, and after the usual marginal planing and beveling the cavity is ready for filling. Fig. 7 gives the occlusal view of the cavities. The cuspid should be filled first. Fig. 8 gives the side view of the cavities in the cuspid and bicuspid shown in Fig. 7.

When the cavity is small it is my custom to fill it with tapes of Abbey's No. 4, exactly as I have described for small cavities in the incisors. When the cavity is large and complicated with labial and lingual extensions, it is my practice to employ cylinders, using cohesive pellets to fill the cusp angle, and to supply such deficiencies

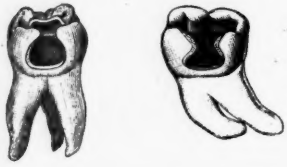
as described before in the case of large cavities in the incisors. The filling in the bicuspid, if small, may be started at the gingival margin with tapes of Abbey's No. 4 non-cohesive gold, worked in the same manner as previously described, until the gingival third of the cavity has been filled and thoroughly condensed, when cohesive pellets may be introduced, working them into this foundation by means of serrated instruments. The filling may be carried in this manner down to the level of the fissure step, when we may commence to build with cohesive gold into the fissure with the aid of a foot plugger, carrying it forward in order to unite it with the gold on the mesial surface. The filling is completed by building the marginal ridge and general contour. When this cavity is large it is my custom to employ cylinders of Abbey's non-cohesive gold for the foundation, building one-third of the filling in this manner, and the middle third with tapes of J. M. Ney's unannealed blue-book foil (semi-cohesive) and finishing the filling with strictly cohesive pellets.

Cavities Between Bicuspids and Molars, on the Occlusal Surfaces of Molars and Bicuspids, and on the Buccal Surfaces of Molars.—Cavities between the bicuspids, *i. e.* cavities on the approximal surfaces of the bicuspids, and cavities at the point of contact between the second bicuspids and first molars, are prepared and filled after the manner described in the case of cavities on the mesial surface of the first bicuspid. The size and extent of these cavities will usually determine my choice between tapes and cylinders for starting these fillings at the gingival margin. When very large and involving the lingual and buccal walls (one or both), my choice will usually fall upon cylinders of Abbey's No. 4 non-cohesive foil, rolled to suit the case. My reasons for this choice are two—first, the cylinders are great time-savers; second, they afford an accurate method of placing the gold leaf in the cavity so as to prevent scaling or flaking after completion. I have experimented considerably with matrices in these cases, but have finally laid them aside (except the band matrix for teeth without distal support) because I have come to regard them as treacherous and deceptive. In working non-cohesive gold into a matrix there is too much danger of scanting the quantity.

We must allow the gold to protrude somewhat beyond the enamel margins in order that it may be malleted and burnished against

those margins after the building of the cohesive portion of the filling. I do not deny that good work can be done with non-cohesive foil guarded by properly adjusted matrices, but the time required to adjust them is too great and the results too doubtful. I should never attempt to work large cylinders into a matrix. Where the molar teeth are extensively decayed, presenting cavities in their approximal surfaces, and carious fissures on their grinding surfaces, the work will in some instances be stronger if the approximal cavities are united with the carious fissures by cutting through the marginal ridges mesially and distally. I do not make

FIG. 9. FIG. 10.



this a rule in practice, for we must consider the strength of teeth as well as the strength of fillings.

It is my custom to fill these fissures and the large central pit in the mesial surface with tapes of semicohesive foil—J. M. Ney's blue-book No. 4, unannealed. This is packed with a foot plugger, starting at the distal end of a fissure and building forward. It is finally malleted over endwise with small points, and cohesive gold is added wherever needed to bring the filling to a proper level.

Buccal cavities in the molar teeth where gold would be considered a suitable material should be prepared with a slight groove, cut with an oval bur within the dentin, all around their circumference. (Figs. 9 and 10.) The marginal edges should be carefully planed and slightly beveled. If it be decided that these cavities shall be filled with gold they should be filled with cylinders of non-cohesive foil, as above described, and in the final condensation, if a pit or a depression—a deficiency of quantity—is manifest, cohesive gold is to be worked in with small serrated points until the surface is brought to proper convexity. Where these buccal cavities coalesce with cavities on the occlusal surfaces of the molars, the foundation of the filling may be laid along the gingivobuccal margin with the non-cohesive cylinders, and after these have been

driven well into the grooves and malleted over the margins, cohesive gold is condensed up to the occlusal angle. We may now fill the grinding surface with tapes of semicohesive gold unannealed, commencing on the distal side and then filling the lingual fissures and building forward, finally uniting this filling with one on the buccal side by means of strictly cohesive gold.

Many very large and sensitive cavities on the approximal surfaces of the bicuspids and molars, especially those extending beneath the gum margin, should be filled throughout the gingival third with tin, or with tin-gold. This is necessary in order to protect the pulp against thermal and electrical stimuli, and to prevent the extension of these cavities by electrolytic destruction of the cavity wall.

The advocates of tin-gold claim for it not only lessened conductivity, but also less discoloration of the tooth than where pure tin alone is employed, and chiefly that the commingling of tin and gold prevents the destruction of the tin by electrolytic action—a result I have frequently observed where small quantities of tin have been placed at the gingival margins and a great mass of gold has been built upon it.

My own clinical observations lead me to accept these statements as well founded. In those cases where I have deemed it best to lay a foundation of pure tin I have usually chosen No. 4 tin foil folded into tapes, which I work into the cavity over the gingival margins exactly as I have described for non-cohesive gold, using a tape wide enough to overlap the gum septum sufficiently to leave a redundancy of tin, which in the final condensation is malleted and burnished to the tooth.

Failures are sometimes made with tin because the operator endeavors to work it in too large masses, and therefore does not obtain perfect condensation and adaptation to the walls of the cavity. It must be remembered that tin foil, no matter how soft and pure, is not as soft and adaptable as non-cohesive gold, and therefore must be worked in smaller quantities than gold and with a stronger condensing force. In working tin-gold at the cavity margins, it is my practice to lay a sheet of No. 4 Abbey's gold upon a sheet of No. 4 tin foil. I cut these into ribbons about one inch wide and fold them into tapes of suitable widths to sufficiently overlap the margins of the cavity to be filled. These tapes of tin-

gold are then packed into the cavity in the manner already described. On account of the probable discoloration following the use of tin, its use should be confined to the posterior teeth and to locations where such discolorations will be out of sight.

In conclusion, I wish to state some of the advantages apparent to me in the practice of starting large fillings, such as I have described, with non-cohesive gold, with tin, and with tin-gold.

First, the cavities need not be extended so far as has been the practice when filling with cohesive gold, because the materials are "more compatible with tooth-structure," for the reason that they are relatively poor conductors of thermal and electric stimuli. I make this claim for Abbey's non-cohesive gold foil as compared with cohesive gold, and surely it has been well established for tin and tin-gold.

Second, no deep or dangerous anchorages need be cut for these non-cohesive materials.

Third, the adaptation is perfect.

Fourth, much time and labor are saved to the operator, and the patient is spared anguish, fatigue and disappointment.—*Dental Cosmos.*

SOME UNUSUAL INCIDENTS. By Bertram C. Best, D.D.S., San Francisco, Cal. In telling of our experiences we do not usually speak of our least successful operations, but are prone to put our best foot foremost and tell of that with which we have had the most success. But we all have had things happen which we did not expect and would rather have missed, and I am no exception to the rule.

I am going to speak of a case I treated some months ago. A young man presented with a lower molar which had pulpitis in a most pronounced form. As he wished to save the tooth if possible, I applied a sedative and dismissed him for a few hours. I then applied arsenic treatment and dismissed him till the next day, but in two hours he was back, suffering intensely, and wished immediate relief of some kind, but still wished to save the tooth. I opened the pulp chamber, applied a sedative, thinking that would relieve him, but with no effect, the pain continuing acutely. I then applied cocain anesthesia and removed the pulp, after considerable pain. The next morning he returned with the fattest face I have ever

seen, and on looking in the mouth, which he could open with difficulty, I saw a number of blisters on his gums, which extended from second molar to cuspid. These looked like water blisters and were about the size of a match head, but were not very painful. I washed the tooth out with warm water and dialyzed iron, but he now insisted on its removal, and I finally consented and removed it, telling him to call the next day, which he did. The swelling was still greater and a red rash had broken out on his face on the affected side, and the blisters on his gums were larger and near the cuspid were soft and flaccid. I opened them, and a great quantity of a thin, clear fluid of a disagreeable odor and, as he said, of a bad taste, came from the openings.

As you may imagine, I was rather uneasy as to the outcome, fearing arsenical necrosis. The following day, however, the swelling began to go down and the rash outside to disappear. In three days he had perfectly recovered, and has since suffered no bad effects whatever from it. Needless to say I have never since used pressure anesthesia following an application of arsenic. Another:

A middle-aged single lady presented, with an inflamed pulp in an upper cuspid. As she wished immediate relief, I decided to remove the pulp by cocain anesthesia. After I had applied the cocain I noticed a pallor and perspiration and all the characteristic symptoms of collapse, and right then I had the most pronounced case of cocain poisoning I have ever seen, and I had some rapid work to do to keep her from going out altogether. After restoring her I then removed the pulp, and she rapidly recovered with no untoward results following. I mention here that for both these cases Dr. Hein's Peritundo would have been ideal.

A man presented with a badly decayed lower second bicuspid, with the cavity post prox. As the pulp was dead and the canal blocked with debris, I was attempting to clear it out with a right angle Gates-Glidden drill held in my fingers. I could not use the rubber dam, as there was no tooth back of the second bicuspid and the cavity was in such a position I could not use a clamp, so I was working without the dam, the mouth being dry.

As I was rotating the drill between my fingers, the patient started to cough and tipped his head forward, pulling the drill out of my grasp, and the spring of the long, slender point flipped it right into his throat just as he drew in his breath for a second

cough, and before I could recover it or even warn him he had swallowed it. I tried to have him get it out, but it was no use, and for all I know he has it yet.

So far as I know he has never suffered any inconvenience from it, and it is now over two years since that happened, and he still owes me thirty-five cents for that drill.

Some years ago a lady brought in a little girl about seven or eight years of age to have a deciduous tooth extracted. The child was badly spoiled and refused to allow me to apply the local anesthetic, crying and fussing, and neither persuasion nor authority could move her. After bothering with her for an hour, by the way, about fifty-five minutes longer than I would now, the child at last consented to allow me to extract the tooth without using anesthetic, or the needle, as she expressed it.

I took hold of the tooth with the forceps, and of course it hurt her, and she commenced to scream. The moment she gave the first scream, the woman seized my coat tail, gave a violent pull, and yelled in my ear: "You brute, what are you trying to do to my child?"

It was so unexpected I lost my hold on the tooth and it remained about half way out, and of course the child would not permit me to touch it again.

I turned to the woman and said: "What's the matter with you; are you crazy?" I found out later she was.

I may mention I never received a cent for my trouble.

One day my office door opened and a man came in, his head and face wrapped up in an enormous dirty rag, which had once been a towel. After he had unwound himself, he said: "You bane the tooth dentist?" Upon my admitting the accusation, he said: "Vell, I vants to gett a teeth fixed unt also I vants to gets some tooth pulled." I examined his mouth, found an inflamed pulp, and after applying a sedative, I said: "Well, how does it feel now?" He replied: "Vell, vell, it is such a different. Yess, yess, it now feels very comfort."

I then extracted "some tooth" for him, and he went away happy for that day. The next time he came I worked on a place that I knew must have caused him severe pain, but as he did not move or display any evidence of discomfort, I asked him if that had not hurt him. "Yas," he said, "you bane hurt like hal all the time."

A young lady came in one day and said: "I want to get a set of teeth for my mother. How much do they cost?" I told her, so she said: "All right. I want to pay for them now."

Having recovered my senses after such a shock, I made out a receipt and she paid me.

I then said: "Now, when can your mother come in to have the impression taken?" "Oh," she said, "I am going to get them for her as a Christmas present, and I am not going to tell her anything about it, but just lay them on her plate Christmas morning and surprise her."

I never saw a more disgusted person when I explained just how they would have to be made.

Last Friday my assistant, Dr. Carter, was removing a pulp from an upper molar, and the patient, an ignorant and uninformed Italian woman, was closely watching every move he made.

He succeeded in removing the contents of the lingual root in one piece, and held it up on the broach to look at it, and as the patient saw it a look of horror came over her face, and as soon as she got out of the chair she said to her companion: "Oh, my tooth he was awful rotten. I musta gotta da fly, for the dentista he sticka da worm and pool heim out. He kicka like infarno, den he thry and thry to sticka da udda, but he no can catcha heem, so he putta da in da meds to keel heem; bimeby he die, den he catcha heem. Hurta life infarno. Maleditta tha dentista."

Last week a lady came into my office wishing to have some extracting done. She said: "Now, doctor, I don't want to be hurt, for I am an invalid and I have a very bad temper."

I replied: "Madam, I am not an invalid, but I, too, have a bad temper,"

"Well," she said, "a long time ago a dentist did some work for me, and he hurt me so bad that he spoiled my temper, and ever since then I have had a bad disposition. Yes, sir; that dentist ruined my disposition. Oh, I don't like dentists. My husband tninks you are a grand dentist, but I don't think so, and I don't like you."

I replied: "Madam, I don't care whether you like me or not, and as long as my work is done right it does not matter."

I seated her in a chair, and as I turned to wash my hands I saw

her get out of the chair and shy off from the fountain cuspidor as if she was going to faint.

"Shut that water off, shut that water off, I can't bear the sight of it," she cried. "You know I am Christian Scientist and a Theosophist and firmly believe in reincarnation. In my last incarnation or previous life I was a cat and lost my life by drowning, so now I hate water, and I can't stand the sight or touch of it. Sometimes I hate water so bad that I can't wash my face for five or six weeks."

"Madam," I replied, "you have made a slight mistake. It is in this incarnation that you are a cat, only you have not been drowned yet."

Then she said: "Now, doctor, are you going to hurt me?" I replied: "As you are a Christian Scientist, you cannot feel any pain when those teeth come out, or shall I use some anesthetic." "Well," she said, it won't do any hurt to use some of that air medicine." "Now," I told her, "this is what we'll do. You use Christian Science and I will use the medicine, and between us we ought to get those teeth out without any pain." After the operation was successfully finished, she said: "Well, I know if I hadn't used Christian Science I would have been hurt terrible bad."—*Pacific Dental Gazette.*

ORAL PROPHYLAXIS. By C. E. Meerhoff, D.D.S., Chicago, Ill. A more or less comprehensive discussion of the subject of oral prophylaxis would seem to require a brief consideration of, firstly, conditions suggesting or requiring oral prophylaxis; secondly, the method by which this ideal condition is obtained; thirdly, some of the benefits to be derived.

Some of the many conditions, one or more of which are almost invariably found in every case presented, and which naturally suggest this treatment, are caries, deposits (either hard or soft), upon the teeth, malocclusion, faulty interproximal spaces, unsanitary crowns and bridges, partial dentures and syphilis.

Without entering into a discussion as to the cause of caries, it appears to be the generally accepted belief that wherever an unclean condition is found, decay of the teeth will be found to a greater or less degree. From time immemorial, the first rule in the treatment

of all pathologic conditions has been the removal of the cause; and while in the past filling of the teeth has supplied our only remedy for its correction, the act of filling a tooth has not only failed of a cure, but has in many cases, by reason of injury to the tissues in instrumentation or through faulty reproduction of tooth form, been the direct cause of pyorrhea or gingivitis. Because this is so, and because our only treatment to date lies in local intervention, the necessity for greater cleanliness is at once apparent.

If there is one condition of the mouth which calls for this treatment more than another, it is that of so-called pyorrhea or gingivitis.

The inefficiency in the removal of the deposits from the teeth, due largely, I believe, to indifference on the part of the operator, would seem to appeal to us for better efforts in this direction, or there is a danger that the term pyorrhea may become synonymous with reproach to the general practitioner.

Too often the operator delays until a more or less tumid condition of the gums or pyorrheal condition of more or less severity exists, before concluding to adopt any form of treatment.

From observation I have determined that a fair percentage of the profession attach sufficient importance to the hard deposits to attempt their removal, but I believe the irritation and the consequent inflammation caused by the soft mucoid deposits about the necks of the teeth and in the interproximal spaces, their removal, and the continued cleanliness of those places are overlooked by many.

According to Dr. George W. Cook, these mucoid deposits are the result of the degeneration of epithelial structure, are of acid reaction and destructive to tooth substance.

In malocclusion oral prophylaxis offers practically the only guarantee against pyorrhea—this is not only true where great deformity exists, precluding the possibility of self-preservation, but particularly in that large class of cases where one or more teeth have been lost early in life, causing the tilting or migration of the adjoining teeth.

Another large class of cases suggesting this method is where we find excess of plastic filling material extending beyond gingival margins of cavities, even where mechanical correctness as to contour and contact have been observed, and a careful study on the

part of every dentist will convince him that he, too, is not entirely blameless.

The advent of the gold inlay as a simple filling or as an abutment in bridgework, either fixed or removable, has succeeded in circumscribing the use of all kinds of crowns; and banded crowns, which, through faulty adjustment, have caused a gingivitis, should be removed, and some form of bandless crown substituted if a healthier condition is desired.

The ease with which the bandless porcelain crown is now adapted readily recommends it as a proper substitute, preferably where a floor is adapted to the end of the root, and a joint so made, requiring the minimum of cement.

Partial dentures contribute much to the uncleanliness of the month, by reason of close adaptation to the teeth, and uneven pressure, and the pumping of secretions into spaces often causes much damage. The best interests of the patient often demand their removal and the substitution of some better form of appliance.

Text-books on operative dentistry and those covering pathologic conditions found in the oral cavity would suggest an infinite number of other conditions demanding intervention in order to obtain a sanitary condition, but these few readily suggest themselves.

Now, Dr. D. D. Smith and his followers insist upon such treatment as has been advocated by them for the correction of the foregoing conditions. Dr. Smith, to whom the credit is due for having evolved this scheme of treatment, defines it as consisting of "enforced, radical and frequent change of environment for the teeth, and perfect sanitation for all oral conditions."

In extreme cases of neglect, misuse or disuse of the teeth, where any effort at relief would be accompanied by much hemorrhage, I have found it sometimes advisable to begin with a more or less superficial treatment of the mouth and dismissing the patient, with instructions to use warm sodium bicarbonate solution freely until the subsequent sitting, when some point would be selected to begin with thoroughness. Where pyorrhea is present, the affected tooth should be scaled with all the skill and exactness at the operator's command, using great care in so doing to avoid injury to the pericemental membrane, and where deep pockets are found, to obviate any roughening of the cementum, flushing the area from time to

time to remove the debris. Each tooth should be carefully scaled on all surfaces before proceeding to its neighbor.

Use is now made of orange wood points shaped to meet the requirements to carry finely ground pumice in the polishing of all accessible surfaces of the teeth by hand, straight sticks being used to reach the points easy of access, and angle-porte polishers for the more inaccessible places. The sense of touch will readily determine for the operator when a surface has been freed from any roughness or from the soft mucoid deposits.

Polishing by hand is advocated because it produces better results than the brush or rubber point in the engine hand piece and greater precision may be exercised to avoid injuring the festoons of the gums.

Phenol sodique may be used advantageously to assist in carrying the powder to the mouth, and incidentally diminishes the soreness caused by the instrumentation. As an adjunct in the treatment, ribbon floss, used as one does the sandpaper strip, will be found of great value in polishing the proximal surfaces of the teeth, used either plain or waxed to carry the pumice. Cutter's letter "R" waxed has proven best in my hands.

During the polishing the operator may carry on his campaign of education and thus enlist his patient's interest, without which he may hope for little result beyond temporary comfort. The treatment is completed by spraying the teeth and adjacent tissue with some astringent solution, using sufficient compressed air to remove all fine grains of pumice to avoid irritation. At this time the patient should be instructed in the proper way he should brush his teeth and use the floss and quill toothpick.

Study of the individual case in hand should be made to discover the region most neglected, and the patient provided with the brush or brushes suited to his case. While I believe some harm is done by too much brushing, it more frequently follows the use of the brush in an unintelligent manner.

Where patients are provided with the floss silk, unless properly shown (not told) how it should be used, they are liable to report to you at a subsequent sitting or after some months have elapsed, showing a considerable damage to the gingival tissue owing to abuse.

This thorough polishing is to be repeated at intervals of one

month or less, as conditions seem to require. This should be an inflexible rule, at least until complete resolution has taken place, loose teeth have become more firmly attached to their sockets, and the surrounding gum tissue firm and unyielding. At these times the operator should study the results, noting and correcting the omission of his patient in the care of such points as are most frequently neglected—the buccal surfaces of upper molars—the lingual surfaces of lower incisors and molars. To ascertain whether the patient uses the brush in the right or left hand is often of assistance in remedying these evils. Remember, one treatment does not constitute oral prophylaxis, and the interest of patient or operator, as outlined above, cannot be acquired or maintained except after months of treatment.

Now, you may ask, What is to be gained by all this effort? Oral prophylaxis is preventive dentistry—it is not advocated as a panacea for all the ailments of the oral cavity, and while it may be called a more or less empirical practice, it requires as much intelligence and as great skill as do the other branches of our practice.

There can be no doubt that when systematic treatment is begun at a sufficiently early stage much of the decay of the teeth may be obviated. That it does retard the progress of caries is obvious. It offers one of the most potent, if not the only, means of curing pyorrhea, when systematically followed up, and, where the tendency only exists, to thwart the ravages entirely. The life of all operations upon the teeth is increased, and not only is this true, but the patient experiences such comfort from day to day as to make the necessity for dental operations appear only as an aid to the maintenance of that comfort, and little to be dreaded.

If it is true that fewer bacteria are present in the mouth after eating, it must follow that their absence is due to their removal during mastication; and their subsequent entrance into the stomach is not vital to the discharge of the normal function of that organ. It is only fair to believe that a sanitary mouth will correct many disorders of the stomach. It seems to me to be within the bounds of reason to believe that after a period the friction of the orange wood sick and the heat generated thereby, applied, as it is, at intervals, would be the means of contributing to the vitality of a tooth and increasing the circulation in the pulp.

The general usefulness of the teeth as a masticatory apparatus is enhanced by the perfect sanitary condition of the mouth, and where lost teeth have been properly replaced, all the teeth are freely used, where in many cases all the work capable of accomplishment was done on one side.

When it becomes necessary to treat the condition of teeth and gums found in syphilitics, a rigid observance of the rules of oral prophylaxis will be the means of saving more teeth and adjacent tissue than any local method of which I know. A case recently under my care even under adverse conditions has succeeded beyond my fondest hopes, and where the loss of at least four teeth was predicted, it has not been necessary to remove one.

I have observed one particular case where the saliva was changed from an excessively "ropy" condition after one year's treatment to what is practically normal.

A pronounced change in the lifelike appearance of the teeth is noticeable after a time, and those teeth affected by erosion lose the extreme sensitiveness usually present. Mouths in which the slightest injury—even the contact of a toothbrush—was immediately followed by the flow of blood will, after treatment, withstand a degree of necessary manipulative abuse, or massage, which could not be applied prior to prophylactic treatment.

The care given to the necks of the teeth has proven to be the means of diminishing the number of unsightly labial and buccal fillings required. The necessity or the desire on the part of the patient for the continuous use of mouth washes is curtailed.

Aside from the value of oral prophylaxis as a means of acquiring true sanitation of the mouth, the influence of the training of the patient in the proper care of the teeth will be productive of much good to the teeth, and directly or indirectly the general health of generations to come.—*Dental Review.*

SENSITIVE DENTIN. By N. H. Harrison, L.D.S., London, Eng. This is a subject which, to judge from dental literature, has not engaged the attention of observers to the extent it deserves. From a practical point of view, an accurate knowledge of its cause, effect and treatment, other than empirical, would be invaluable. No longer would the dental surgeon be regarded as the instigator of pain, but rather, as he is, a philanthropist with scientific knowledge.

In whatever light we look at sensitive dentin, and whatever view we take of its nature, whether pathologic or non-pathologic, it still remains a clinical bugbear, the sooner understood and grappled with, the better. It would be quite out of proportion for me to discuss in detail the various theories advanced in elucidation of this problem. Roughly speaking, there are two main camps, one in which the standard of pathology is raised, the other in which the standard of nature is raised. To determine whether this phenomenon is pathologic or natural is extremely difficult, for sensitiveness is such an elusive thing. All pathologic teeth are not sensitive, neither are all sensitive teeth pathologic. Similarly, all healthy teeth are not sensitive, neither are all sensitive teeth healthy. Microscopic examination of a pathologic sensitive tooth, *e.g.*, a tooth worn away by attrition, and acutely sensitive to thermal and chemical change, reveals nothing to my inexperienced eye to differentiate it from a normal tooth in reference to its sensitiveness. The dentinal tubules in transverse section are not relatively larger in area, neither are they more numerous. The contents are not, so far as I am able to discover, abnormal. It is true there are the striking secondary deposits in the pulp-chamber, and the partial calcification of some of the tubules themselves, but I do not gather from the authorities I have consulted that secondary dentin has anything to do with the sensitiveness of dentin. Secondary dentin is present whether the tooth has been sensitive or not, and one would rather have supposed that the calcification of the tubules would reduce the sensitiveness. If sensitive dentin is a pathologic condition, then it follows there must be some pathologic cause. This may apparently be satisfactorily given in some cases, but in others, from the pathologic standpoint, the condition remains an enigma.

We shall be associated with our distinguished lecturer in dental anatomy, if we regard sensitive dentin as a normal condition. As variable as the morphology of dentin, so variable is its sensitiveness. I will, therefore, assume that view.

What is understood by sensitive dentin? Am I right in saying that it is that property in which more or less pain is experienced when dentin is exposed to abnormal conditions? The locus of the pain has not yet been determined. No nerve filaments have yet been found in the dentinal tubules, although Mr. Mummery has

shown by his iron preparations fine fibrils in connection with nerve bundles in the pulp running outward toward the dentin and right up to it as though they entered it. Dr. Dentz, of Utrecht, once made sections cut from embryos showing pear-shaped bodies regularly arranged within the border of the dentin. These bodies appeared to be in connection with the dentinal tubules and the pulp and were considered to present close resemblance to some form of nerve end organ. No one else has been able to demonstrate these bodies and Mr. Hopewell-Smith told me Dr. Dentz himself has been unable to prepare similar sections since. The odontoblasts and their processes, the dentinal fibres are excluded from being nervous tissue comparable to the specialized epithelium of the nose, ear, and eye from their development, for we are told they are mesoblastic in origin, and nervous tissue is epiblastic. They may have some obscure sensory function, and it seems to be generally recognized they have. It is very significant that the pulp is abundantly supplied with nervous tissue, apparently quite out of proportion to its own needs, and that the nerve fibres themselves, seemingly by dint of a common purpose, press outward through the vicissitudes of the pulp to end, so far as we are able to judge at present, in varicose non-medullated fibrils embracing the odontoblasts, and to the more imaginative of us insinuating themselves into the dentin. The theories purporting to explain the relation of nerve endings to the odontoblasts is legion. Every histologic mountebank has his pet idea on this subject. Of the numerous authorities, Mr. Hopewell-Smith has selected eight of the most erudite, and has represented their views beautifully in diagrammatic form in his text book. As students, we must accept the view taught us until we are competent to investigate, weigh and form our own views. We are taught here that medullated nerve fibrils enter the pulp, and pass toward the periphery, and on their way they branch and lose these neurilemma sheaths just below the membrana eboris, and what are now the fine non-medullated fibrils form a plexus from which varicose fibrils pass all round the odontoblasts, some closely adhering to the cell-wall, others vanishing away in the direction of the dentin. Thus a basketwork of nerve fibrils surrounds each odontoblast. From this hypothesis, then, we are led to explain that the sensitiveness of dentin is due to some stimulus transmitted along the dentinal

fibre to the odontoblast; from there to the enveloping basket, and so on to the central nervous system.

There is one, possibly two or more ways in which this stimulus may be transmitted. It may be through the calcified portion of the dentin. The stimuli, however, usually giving rise to sensitiveness are particularly ineffectual in producing change in solid salts which compose dentin, the bulk of which is calcium phosphate. It is, therefore, highly improbable that the calcified portion of dentin conveys stimuli usually associated with sensitive dentin. That the calcified portion of the tooth does convey sensation is patent, I think. Everyone is familiar with what is popularly called the "setting on edge" of one's teeth, and he must be imperturbable who can see, without chafing, a person sucking a lemon. The teeth exercise a nice discrimination, and will readily distinguish in a broad way articles taken in the mouth. For example, you know at once whether you are eating a biscuit or a cinder. Your incisor teeth will not be slow to tell you that ice cold water is unpleasant to them, and that they resent being plunged into alum, and that cataphoresis is an abomination. The quantity of heat transmitted along the calcified substance might be ascertained by means of the thermopile connected with a galvanometer. All these sensations are conveyed through the enamel, a substance in which, according to Tomes, there is no noteworthy amount of organic matter. Then again, if as some people think, the dentinal fibre during life is bathed in a serous fluid contained in the tubule, the stimuli might be transmitted along this fluid. It is widely considered that during life nothing is found in the tubule but the dentinal fibre which completely fills it. Post-mortem change accounts for the apparent space between the fibres and the sheaths of Neumann as seen in section. It amounts to this, then, that the phenomenon of sensitive dentin is largely, if not entirely, to be explained through the understanding of the function of the odontoblast and its dentinal fibre, for through this medium stimuli mostly reach the nerve endings.

Analyzing the so-called clinical causes of sensitive dentin, it is found that they may be conveniently grouped under four heads corresponding to the various distinct kinds of stimuli, viz.:

(1) Mechanical, for example, the cut of an excavator or bur.
(2) Chemical, for example, the application of zinc chlorid.
(3) Thermal, for example, hot or cold air.

(4) Electrical, for example, cataphoresis.

It is noticeable that all these stimuli give the same result, pain, in a greater or less degree. The pain is always disquieting and never palliated by pressure as in incipient pericemental membrane trouble. The pain is usually of an excruciating nature, continuing as long as the stimulus is applied, and disappearing on removal of the stimulus. If the stimulus is continued, inflammation and subsequent degeneration of the pulp may ensue. This is usually safeguarded against by the deposition of secondary dentin in the pulp chamber, thereby protecting the pulp. Whether the calcification of the dentinal tubule, so frequently seen in the case of teeth worn by attrition, results from the long-continued mechanical stimulus of mastication, I cannot say. It is of interest that all stimuli are not equally powerful in their action on the same tooth, also the same stimuli have different effects on different teeth and on different patients. Some come complaining of pain on "heat or cold," and not of "sweet or sour" and *vice versa*. An acid saliva, I read, predisposes to sensitive dentin. I have not followed this line of observation very far and my statements are based on what is necessarily a very limited experience. They are hazarded simply to indicate that some kind of classication might be made.

All clinical data are useful, whether they are directly or indirectly involved in any particular condition, and I think a collation of personal facts, however irrelevant, is interesting and instructive. Therefore, I am curious to discover whether temperament, habit, environment, have any concern in the sensitiveness of any tissue, and especially in the sensitiveness of dentin. Some of the systemic diseases may predispose to sensitive dentin. I may mention here the case of a patient of mine, himself suffering from lumbago, who mentions a family history of gout, and who has had adenoids causing mouth-breathing, and as a result has a narrow dental arch, and superior protrusion. I am treating him for pyorrhea alveolaris, which he tells me has had a considerable course. I have had occasion also to insert one or two fillings, and have experienced extraordinary difficulty in excavating owing to sensitive dentin. My inevitable surmise, and I think by no means a wild one, is, can there be any correlation between these conditions? Are they in any way interdependent? It is essential to have record of a large number of similar cases before any conclusion, however flimsy, is permis-

sible. Such a record I have not been able to find, but I think one is worth while making.

Having in a cursory way reviewed the possible media through which it is thought stimuli are transmitted, and having enumerated the various kinds of stimuli themselves, it is now left to determine how these stimuli are transmitted. In dealing with the great problems of physiology, it is found that in a general way there are two main schools, the physicists, who explain as far as possible the functions of the various organs of the human body by bringing them into line with inviolable physical laws, and the vitalists, who attribute to living protoplasm some inherent property which is able to select and reject, become active or passive, as the exigencies of the case demand. So in this matter of sensitive dentin, there may be collected within the range of these two schools all the many theories and opinions explaining how stimuli are conveyed to the nerve endings. A consideration of the views of those who would urge the physical explanation of this phenomenon is called for first.

It is said an abnormal movement of the molecules of the dentinal fiber will act on the nerve endings, and thus cause pain. Some would go so far as to say that the movement of the molecules of the calcified portion of the tooth exerted by the jarring of an excavator or bur is sufficient to cause pain. This may explain some cases, but one can jar a tooth pretty severely without causing the pain characteristic of sensitive dentin. And dentin which is sensitive to the excavator, is usually found sensitive to hot air, while jarring is out of the question. In the cases I have met, jarring has had no evidence in its favor.

Then there are some who believe that hot air causes convection in the protoplasm of the dentinal fibres, and so irritation to the nerve endings is brought about. We take that view for what we think it is worth.

Coming to the more feasible views:—A change of pressure in the pulp chamber will affect the nerve endings. This change can be instituted either by an increase of pressure from without, the pressing on the outer end of the dentinal fibre, or by a change of volume in the fibre itself. For example, hot air would cause an expansion, and cold air a contraction. Drugs like zinc chlorid would change the volume by coagulation; sugar, alcohol, and similar substances would absorb water. These stimuli, then, would act in a varying

degree according to the different powers of establishing change of volume. Gentlemen, am I right in saying that if this phenomenon is to be explained by physical laws, then these laws can be demonstrated as operating in artificial, but similar conditions to those prevailing in the mouth? Therefore, if a dentinal tubule with its fibre could be isolated and taken from its natural position, any change of volume and consequent change of pressure on the application of stimuli could be demonstrated by suitable apparatus. With this in view, I made the following experiments: Two pieces of fairly small bore glass tube were taken and joined by a close fitting india-rubber tube. Here was a representation of dentinal tubule. Into one of the tubes I introduced a little water colored with potassium permanganate. Into the other I introduced fresh egg albumen—a substance as nearly like the protoplasm as I could get. It is clear that relatively as much change in volume of the albumen, as well as difference in pressure, will be indicated by the movement of the colored water as would take place in a dentinal tubule. To measure these changes, some graduation of the tubes was essential. My original intention was to use an old thermometer tube, instead of the small bore tube, but the difficulties in the details of the experiment rendered this impracticable. I therefore marked equal divisions in ink on a piece of paper, and rolled the tube which was to contain my indicator over it. The ink impressions left on the tube gave a rough graduation. Some little distance from the free end of the other tube I made a file mark, so that the same quantity of albumen should be used for each experiment. The following experiments were carried out: Fresh albumen was sucked up to the file mark in one tube, and a drop or two of the indicating fluid sucked up into the other tube. Both tubes were then connected carefully, and the one containing the indicator was fixed under the low power of the microscope so that very small changes could be observed. The position of the indicator was noted. Two drops of warm water were applied to the albumen, and the indicator passed two divisions in the direction of the albumen. A crystal of brown Demerara sugar, small enough to easily pass up to the albumen was applied and allowed to remain in contact for three minutes. There was no movement of the indicator. Three drops of saturated solution of sugar were then used. The indicator moved two divisions in the direction of the albumen. In succession a crystal of

common salt, and three drops of a saturated salt solution, a bleb of lemon and three drops of lemon juice were then applied, and finally a red hot needle and an ice cold needle. In all, nine experiments were made. Fresh albumen was used for each experiment. To summarize the results, it was found that the crystal salts gave no appreciable change of pressure, and the solutions caused a change of two divisions in the directions of the albumen. This change, I think, is to be accounted for by capillarity. The hot needle coagulated the albumen in contact with it, but only a slight change of pressure was noted. The cold needle gave no result. These very rough experiments, which were carried out in more favorable conditions for showing pressure changes than actually occur in the living tooth—the end of the tube, corresponding to the pulp end of the dentinal tubule, being open to atmospheric pressure instead of closed as in the pulp chamber, place their evidence *en bloc* against change of pressure being the cause of irritation to the nerve endings.

There is yet one more theory of the physicists, who declare that osmosis in the case of liquids, and diffusion in the case of solids, are the methods of transmission of stimuli. This can only apply to chemical substances, and from my very small knowledge of physics, I gather that osmosis and diffusion are comparatively slow processes, whereas pain results almost immediately on the application of such drugs as zinc chlorid to dentin. Osmosis and diffusion may account for some cases of sensitive dentin, but not for those cases where thermal stimuli are used.

Passing from the theories of the physicists to those of the vitalists. That the dentin requires nourishment, I think, is conclusive from the fact that during certain systemic diseases, where there is a general malnutrition, the teeth are more readily vulnerable to dental caries. No lymphatics have yet been discovered, either in the pulp or dentin. Therefore the dentinal fibre is regarded as exerting a trophic influence on dentin, carrying nutrition to and waste matter from the dentin. This presupposes a circulation in the protoplasm of the fibre. Foster says, "the power by which the movement of fluids in the protoplasm of the tissues is maintained is the function of osmosis inherent in protoplasm. Upon this depends the flow of the fluids which create and continue life in all animal organisms, even that highest elaboration of protoplasm called man." I

also gather something to the effect that the living protoplasm of the dentinal fibre—which by this process of osmosis is rendered a corporate whole, each part being in communication with every other part—has an exquisite sensitiveness to anything injurious to its well being, in much the same way as the ameba. On the slightest provocation, the ameba will withdraw into pseudopodia, and, as it were, draw itself up into the most advantageous position for resistance, so the dentinal fibre will contract on the slightest irritation, and cause pressure on the nerve endings. Dead protoplasm will not contract; dead dentinal fibre equivalent to the albumen I used will not contract.

A vitalist theory propounded some years ago by a Brazilian stated that the dentinal fibre, in common with all living protoplasm, was made up of vibriones, and on the application of stimuli those nearest receive the shock and fall pell-mell backwards on to those behind, and thus set up an appalling panic in which some are trodden underfoot and killed, and others in their heartrending effort to get away from the awful catastrophe hustle and fight, until, in their mad career, they jostle up against the nerve endings, and so cause the convulsions of sensitive dentin.

The dentinal fibre is made up of living protoplasm or bioplasm, as it is now called, and it is the "bios" that gives it its exquisite discrimination between what is good for it and what is not. Therefore, before I leave the vitalists, may I mention as a very tentative suggestion, what has occurred to me in this connection? It has been shown that in muscles that are removed from the body, on leading off parts of their surface to a galvanometer, the galvanometer needle generally swings. The most marked result is obtained with a piece of muscle in which the fibres run parallel to one another, and the longitudinal surface is connected with one of the cut ends by a wire. This current passing through the galvanometer is set up by a change of electromotor force in the parts of the muscle due to injury in removal. A muscle at rest, and absolutely uninjured, is isoelectric. As soon as a muscle is injured, a current flows in the muscle from the injured part, which has thereby been rendered positive, to the uninjured part. The greater the injury, the greater the current. This current is called the demarcation current. Muscle is not the only tissue which exhibits electrical phenomena. A nerve which is uninjured is isoelectric;

injury causes the demarcation current. The activity of secreting glands, vegetable tissues, retina, etc., is accompanied with somewhat similar electrical changes. The most noteworthy exhibition of animal electricity is seen in the electric organs of electric fishes, which on activity discharge electricity. Now it does not require great perspicacity to see that an analogy may be drawn between the activity of these tissues under stimuli, and the activity of the dentinal fibre. It is conceivable that every time the exposed end of a dentinal fibre is injured by the various stimuli mentioned, a current may pass from the injured end along the fibre to the odontoblasts and on to the nerve endings. Experience has shown that dentin is often more sensitive just under the enamel than elsewhere. This is the region of the interglobular spaces. Presuming that during life these spaces are filled with protoplasm, then this region would offer a greater area of living matter to be injured, and consequently a more powerful current would be transmitted. However far-fetched this may appear, it is food for reflection.

Coming now to the treatment of sensitive dentin. Innumerable methods of treatment have been tried, and no specific has yet been discovered. I will briefly mention the principal methods of treatment, enlarging a little on one particular method. Surgeons have met with success in dealing with this condition by anesthetizing the tooth. For this purpose ethyl chlorid spray has proved efficacious in three cases I have treated. Other methods of treatment are dehydration either with hot air or with alcohol, or a combination of both; temporary watertight plug inserted in the dry cavity and left for a little time, such as the oxyphosphate cement; by cataphoresis—electrical osmosis—from all accounts a tedious, painful and most uncertain method; and finally, by the most important method of drugs. It is this last method that will occupy the remainder of this paper. I may say here that I cannot offer you any panacea. I can only review already established drugs. The drugs mostly used are those which either anesthetize the dentin, *e.g.*, cocain and its preparations; those which act as a sedative to the nerve endings, *e.g.*, the aromatic volatile oils; those which destroy the protoplasm of the fibre by coagulation, *e.g.*, the caustics; those which, given internally, have a depressant action upon the cerebral nerve centers, *e.g.*, the analgesics. All these drugs, except the analgesics, are applied locally either in solid form, in solution, or volatilized by hot air. The

usual method of local application is by the crude, unscientific, blundering swabbing out of the cavity with an indefinite dose, and an uncertain strength of drug. Swab the cavity, and trust to luck might be added to Mr. Whitehouse's aphorisms. If one drug fails, try another, or a blunderbuss prescription if you like.

What are the best drugs to use? The ideal drug would be one which has a determinate penetration, the anesthetizing without destroying, and having neither injurious effect on the pulp nor discoloring the dentin and enamel. Such a drug has yet to be discovered. Those drugs which seem to come nearest to the ideal are the aromatic volatile oils, but as everyone knows, these sometimes fail lamentably.

I should like to bring before your notice a series of experiments I performed on dead teeth, with the idea of ascertaining the relative penetrating power of some of the more common obtundents used. Such experimentation I cannot help thinking will ultimately lead to rational treatment. My original plan, and one which I am still hoping to complete, was to experiment on living teeth. Suitable material is scarce, and for the purpose of this paper, I was compelled to fall back on dead teeth. Before I proceed with a description of the method I adopted, may I give a very brief *resumè* of two very valuable contributions to the *Cosmos,* one by the late Dr. Miller and the other by Dr. Truman.

Dr. Miller, by bacteriologic methods, made 393 separate experiments with this object, he tells us, "of determining what antiseptic penetrates pulp tissue most readily and deepest, and most effectually preserves it from decomposition." He used the pulps from the teeth of calf, man and dog, and his results are most instructive. I would refer you to the *Cosmos,* 1890, where you find laid out the merits of the various antiseptics.

Dr. Truman's experiments are of more immediate interest because they were designed to show the relative penetrating power of coagulants in the treatment of root canals. Dr. Truman disposes of the prejudice against using coagulants in the treatment of roots, because the coagulation prevents further penetration of the coagulant. He further indicates to what extent coagulants can be relied on to effect satisfactory results. He took tubes not exceeding .5 millimetre in diameter, filled with albumen and glycerin, and applied a variety of drugs for a given period. At the end of this period (10 days)

he measured the length of coagulation. He concludes from his experiments: (1) That coagulants do not prevent by their own action diffusion throughout the entire tube; (2) That the penetrating power of such agents as creasote, phenol and zinc chlorid, those most frequently used, varies materially; (3) That in proportion to the coagulating power of the agent will be its penetrating force independent of gravitation. Dr. Truman extended his experiments to dead teeth by filling the root canals with a number of coagulating agents. His experiments are detailed in the *Cosmos,* 1895.

The experiments I made are trifling compared with those of Dr. Miller and Dr. Truman, but I venture to relate them, in the hope that they may not be altogether without the interest attaching to a modest attempt to take a practical part in unraveling the mysteries of our profession. Fresh teeth were taken, and a cavity made in the crown. Each one of the following drugs was applied in different teeth for one minute, five minutes, and one week—viz.:—oil of cloves, silver nitrate, zinc chlorid, arsenic trioxid on fibre. My chief effort was to simulate the conditions prevailing in the mouth. The durations of application were chosen as nearly corresponding to those usually given in the treatment of sensitive dentin. The drugs, you will see, are those used most commonly at this hospital. My first obstacle was how was I to show the penetration of the drugs. It was essential to have some coloring matter, and a coloring matter that would indicate the penetration of the drug by keeping absolutely with it. In those drugs containing water, the common stains form a combination with the water present, and, as a result, the stains either go ahead or lag behind the drug, as the case may be. Briefly, each drug had to be considered separately in this matter. After much testing and care, I resolved on the following methods: With oil of cloves, the water difficulty not entering in, I mixed some solid eosin. With pure phenol, obtained from the deliquescence of phenol crystals, the amount of water was ignored, and solid eosin dissolved. In one case, however, I used phenol without a stain, and afterwards applied ferric chlorid, trusting to get a blue coloration where the phenol penetrated. With zinc chlorid I endeavored to precipitate zinc sulphid in the tooth substance by immersing the tooth in ammonium sulphid. In a similar manner with arsenic trioxid, I endeavored to precipitate arsenious sulphid by immersing the tooth in formalin, and allowing hydrogen sulphid to

bubble through for six hours, and leaving the tooth in the saturated solution for six weeks. In the case of silver nitrate, the drug itself showed its own penetration. I have not yet been able to obtain a suitable stain for alcohol and other drugs I should like to have tried. After experimentation the teeth (with the exception of four, I was fortunate enough to have obtained, and worked as living teeth, and which were carried through a modification of the Koch-Weil process) were ground, dehydrated and mounted in balsam. On examination under the microscope, the following observations were made:

Silver Nitrate, rubbed on the exposed dentin for one minute. Section shows very slight penetration and discoloration.

Zinc Chlorid, solid applied for one minute. Section shows no appreciable change.

Phenol, applied for one minute. Section shows hardly any penetration.

Arsenic trioxid, applied for one minute. Section shows no appreciable penetration.

Oil of Cloves, applied for one minute. There is no trace of penetration. Possibly the eosin was washed away in preparation.

Silver Nitrate, 5 minutes. Section shows very little more penetration than the one minute section. The discoloration is interesting, being purple towards the pulp, and gradually shading off to black at the periphery.

Zinc Chlorid, 5 minutes. This section shows a marked translucency where the drug was applied, as though the matrix had been attacked, and its refractive index altered. Whether this is due to the drug or a fault in preparation, I cannot say. The other section where this drug is used shows a similar translucency.

Arsenic trioxid, 5 minutes. This section passed through a modification of the Koch-Weil process, being obtained from a living specimen. It shows slight penetration.

Arsenic trioxid, 5 minutes. Slight penetration shown in the section, but there seems to be a disintegration of the dentin, a condition very well seen in the section of one week application. This indicates the extreme caution necessary in using this drug on the teeth.

Oil of Cloves, 5 minutes. This section, taken from a living tooth, shows slight penetration.

Silver Nitrate, one week. Section shows a dense, but slight,

penetration, being, in fact, only a little further than the 5 minutes' section. An interesting discoloration is seen affecting both enamel and dentin. The structure seems intact.

Zinc Chlorid, 1 week. Section broken in preparation. A one hour section shows good penetration and the translucency noted before.

Phenol, 1 week. Section shows fair penetration.

Arsenic trioxid, 1 week. Section taken from living specimen, shows the canary-colored precipitate of sulphid penetrating to the pulp. The disintegration of the dentin is well shown.

Oil of Cloves, 1 week. This section taken from a live specimen, shows a penetration to the pulp. The structure of the tooth is intact.

These sections seem to point to the futility of simply swabbing out a cavity as a means of allaying its sensitiveness. They also show, I think, that arsenic trioxid should never be used as an obtundent, also that zinc chlorid, if my interpretation of the sections be correct, is undesirable, as it materially alters the structure of the dentin. Phenol shows a fairly good result if left long enough. Silver nitrate destroys the dentinal fibres, and only shows a slight penetration on a long application. Oil of cloves has very little effect if left for short periods, but a week allows of penetration to the pulp. Deducing a treatment from the observations of these sections, one would be compelled to say: Oil of cloves, representing the aromatic oils, applied for at least a week under a water-tight plug, effects a good result, reaching the nerve endings. For immediate treatment, silver nitrate rubbed on for a minute or two coagulates the dentinal fibre, and so prevents the full transmission of stimuli. This coagulation, however, is very superficial. Phenol may be used for immediate treatment, for it acts by coagulation. Until one is able to discover what the action of zinc chlorid on the dentinal matrix is, it would seem that, ideally, this drug should be avoided.—*Dental Record.*

A FEW THOUGHTS THAT CONCERN THE IMPORTANCE OF THE TEMPORARY TEETH. By F. M. Casto, M.D., D.D.S., Ph.G., Cleveland, Ohio. In presenting the subject that has been assigned to me for the purpose of elucidation, I shall divide it into three parts.

First—The development of the temporary teeth, their subsequent

eruption and the simultaneous development of the process and maxille.

Second—The function of the temporary teeth and arches.

Third—The evil results that are liable to follow the premature loss or the prolonged retention of the temporary teeth.

In regard to the development of the teeth, it is not my desire nor intention to elaborate upon or discuss the embryologic phenomena. Authorities hold divers opinions with regard to the early stages of development, probably because of the difficulties with which the experiments are conducted. Frey has well said that "tooth development is the most difficult subject that the embryologists are called upon to demonstrate." Most authorities agree, however, that the teeth are developed in the mucous membrane, and are a part of the outer or dermal system of the body, and grow by a process of involution.

The first traces in the beginning of the development of the temporary teeth are to be found about the seventh or eighth week of intrauterine existence, when preparation is made for the development of the enamel germ or matrix. After this time their growth progresses with a wonderful regularity. The teeth are gradually developed from small papillæ which, as they slowly increase in size, assume the shape of the crown of the particular class of teeth they are destined to become.

Dentinification first begins upon the cutting edges of the incisors, the points of the cusps of the cuspids and molars. From these points the process continues laterally over the entire surface of the crown until a layer of dentin envelops them within the enamel cap. Then follows the solidification by the formation of the dentin, layer after layer, one within the other. The formation of the dentin differs from the ossification in that the deposition of dentin is only from one side of the odontoblast, while in ossification the bone is formed circumferentially from the osteoblasts.

At birth the general forms and outlines of the crowns of the temporary incisors and cuspids are practically complete. The crowns of the temporary molars are formed shortly afterward (six months). They are all contained in their crypts within the substance of the body of the jaws.

The eruption of the teeth and the coincident development of the jaws are practically the same in the upper and lower jaws. There-

fore, for the purpose of facilitation, I will only consider the mandible.

Examination of the mandible at birth shows it to be short mesiodistally, thin vertically, and the ramus joins the body at quite an obtuse angle (about 25 degrees). It develops in three directions; mesiodistally, vertically and labio or buccolingually.

Most authors claim the development in an anteroposterior direction takes place between three points, namely, the symphysis, mental foramen and the angle of the jaw.

In the growth of the mandible there are periods of activity and periods of rest. The periods of activity occur in certain parts which correspond to the formation and eruption of the teeth situated in those respective parts; that is to say, during the formation and eruption of the incisors, growth in that portion of the jaw in which they are located becomes actively stimulated. So also does the same process occur during the formation and eruption of the cuspids, premolars and molars. It therefore behooves us to be familiar with the time of the formation and eruption of the various teeth, both temporary and permanent, in order to determine whether or not normal development is taking place.

As the eruption of the teeth takes place, the crowns are pushed upward and the alveolar process is developed. Simultaneous with the upward movement of the crowns of the teeth, their roots grow downward, which causes development along the lower border of the body of the jaw. At the same time there is growth in an anteroposterior direction. Consequently the vertical diameter is increased, the angle becomes less obtuse and the jaw is lengthened mesiodistally.

The increase in the vertical diameter is due to the formation of bone on the lower border of the body of the jaw, and the development of the alveolar process on the upper aspect. That the alveolar process is subservient to the uses of the teeth is proved by the following facts: It first develops with the temporary teeth and is resorbed when they are lost; develops again with the permanent teeth and likewise is resorbed when they are lost. So there are two separate and distinct formations of the alveolar process, just the same as there are two separate and distinct sets of teeth. This fact, I believe, is not generally understood, or at least not

generally considered. Most men labor under the impression that the succedaneous teeth occupy the same positions and are supported by the same process as their predecessors. It is universally recognized, however, that no matter what positions of irregularity the permanent teeth may occupy, and regardless of whether or not the temporary teeth are still in position, they are always supported by an alveolar process.

The angle of the jaw becomes less obtuse because of two reasons: First, as the occlusion of the teeth is established and the muscles of mastication are developed, there is a bending of the jaw at this point. Second, there is a growth of bone on the posterior borders of the ramus that is continuous with the growth on the lower border of the body of the jaw, which is coincident with the formation of the teeth and the forward development of the body of the mandible.

Dr. Cryer claims that the increased length, mesiodistally, is due to an interstitial development caused by the lateral pressure of the teeth in contact, and to the stimulus created by the formation of the crowns of the teeth in the body of the jaw. For illustration, let us assume that the temporary laterals and temporary first molars are in place. When the temporary cuspids erupt they will wedge in between these teeth, exerting a lateral pressure that causes the so-called interstitial development, and thereby creates space for their accommodation. For further consideration, let us assume that the temporary denture is complete and in situ. At the age of six years the formation of the crown of the first permanent molar has stimulated growth in the body of the mandible, and while the tooth is erupting it advances between the ramus and the second temporary molar, thereby wedging into position and causing all the teeth mesially to move forward. Thus the mandible is lengthened in an anteroposterior direction. For another illustration, let us assume that the temporary laterals are in position and the permanent centrals are forming and erupting. They advance side by side, their mesial surfaces in contact and their distal surfaces exerting pressure, first against the roots of the temporary laterals and next against their crowns, thus acting as a wedge, consequently producing growth in that region. The lateral incisors wedge between the central incisors and temporary

cuspids, the cuspids between the lateral incisors and temporary molars, or more usually, the first bicuspids.

In a normal temporary denture at five years of age there are spaces between the incisor and cuspid teeth. These spaces are due to the formation of the crowns of the permanent teeth and the consequent development of the jaws. This condition usually indicates that the permanent teeth are undergoing a normal process of development and that they are placed in their "regular irregularity." In such cases, however, it does not always follow that the permanent teeth will erupt in normal occlusion. I have seen such cases in which malocclusion followed in the permanent denture. So also have I observed cases in which there were no spaces between the temporary teeth, and yet the permanent teeth assumed their correct positions in the arch. I have no doubt that many of you gentlemen here tonight have observed such cases. For instance, have you not observed children in whose mouths the lower central incisor erupted in a position lingual to normal, and have you not later seen those teeth push forward into proper alignment?

The functions of the teeth and arches may be said to be as follows:

First—To aid in the development of the jaws.

Second—To incise and masticate the food.

Third—To perform a certain part in the phenomena of speech.

Fourth—To give shape and beauty to the jaws and face.

Fifth—To form the inner fortification against the accidental entrance into the mouth and throat of foreign substances.

The functions of the teeth are very closely allied and are to a very large extent dependent one upon the other. Any interference is quite liable to act detrimentally and prevent to a greater or lesser extent the fulfillment of the proposed work. I have already discussed the function of the teeth that relates to the development of the jaws, so I will pass to function number two and consider the temporary teeth as masticatory organs.

Since the interesting and instructive lecture Dr. Sawyer gave us recently, I think we all have had more consideration and thought regarding the necessity of the proper mastication of the food. For how many of us realized the terrible sequelæ of improper mastication?

The temporary denture is, or should be, complete at the age of about two and one-half years. By this time the child is ready for a solid diet. The temporary molars serve as the masticatory apparatus from this time until about the sixth year, at which time they are reinforced by the eruption of the first permanent molars. After the eruption of these molars the temporary molars are relieved of a considerable part of their work. They render active service, however, until the child reaches the age of 10 or 11, at which time, by resorption of the roots of the temporary molars, caused by the advancing crowns of the permanent teeth, they become loose, unstable in their sockets and unfit for further duty.

The service of the temporary molars as masticatory organs extends over a period of some seven or eight years. This service is rendered at a period in life when it is absolutely necessary that mastication be thorough. It is essential to the health of the child and to the development of the bones and muscles, and to all the organs of the body. For what untoward results might not follow malnutrition in a growing child? At this tender age all the organs of the body are being taxed to their utmost capacity, and I know of nothing that will cripple a child's vitality so quickly as to have their masticating apparatus impaired, either by partial or complete loss of some or all of the teeth. Sometimes I wonder whether or not the temporary teeth are given due consideration. I have seen a few cases where most all of them had been lost under 6 or 7 years of age, and it is not an uncommon thing to observe the premature loss of some of the temporary molars. There is no doubt that in many cases it is almost impossible to save temporary teeth; but I am rather inclined to conclude from my observations that quite a number of them are lost that might be saved by persistent and paintaking operations.

Function number three—to perform a certain part in the phenomena of speech. Speech is the most direct and the most important instrument for the conveyance of thought. By it men are put in possession of the thoughts and experiences of their fellow-men, so that the development of mind itself may be said to depend greatly upon speech. The organs uniting in the production of speech are the vocal cords, lips, tongue, teeth, dental arches and the intellectual faculties.

The teeth and arches are directly concerned in articulation.

Articulation consists in the correct and distinct utterance of the elementary sounds in syllables and words. In nearly all of the many definitions given by lexicographers and elocutionists, the prevailing ideas have been distinctness. In the process of articulation the organs of speech constitute what may be termed a set of molds, capable of changing position at will, and any imperfection in the molds or in their arrangement will product a corresponding imperfection in the sound. The normal-shaped dental arches and the correct positions of the teeth contribute much to the purity and richness of the tones and enable one to have much better control of the voice. In proportion as the teeth and arches are imperfect, so will speech be imperfect. I have had the pleasure of examining the mouths of a few prominent actors and public speakers, and without a single exception I found they had well-developed jaws and dental arches. I do not believe that the magnificent voices possessed by actors such as Richard Mansfield, E. H. Sothern, Otis Skinner and William Farnum, and singers such as Melba, Nordica, Shumann-Heink and Patti could be produced in any other than those who have normally developed jaws and arches.

I have observed marked improvement in speech in a number of cases of malocclusion of the teeth that have been treated. One case in particular was of considerable interest. The patient was a boy of 11 years old. He had a distal occlusion of the lower arch in its relation to the upper, contracted upper arch, protruding upper incisors, and was a mouth breather. The posterior nasopharyngeal space was filled with adenoids, completely occluding the nares. He had a very bad impediment in his speech, so bad, in fact, that at times he was unable to utter a word for several seconds. While endeavoring to talk during one of his worse spells, he would twist and draw the muscles of his face into all kinds of contortions. The adenoids were removed and the nares properly opened. The orthodontic operation extended over a period of about two years, during which time there was a gradual improvement in speech. The improvement continued until the defect was entirely cured.

Function number four—to give shape and beauty to the jaws and face. The alveolar process and teeth contribute very largely to the formation of the maxillæ; they are prominently situated upon these bones and bear an important relation to the establishment

and maintenance of facial harmony and contours. Perhaps the extent of this relation is not realized until one has had the opportunity to observe patients who have had malocclusion of the teeth and abnormally formed jaws corrected, or patients who have lost all the teeth, and the subsequent resorption of the process had taken place and later the facial harmony had been restored by artificial dentures.

The attachment of the muscles, the form of the lips and cheeks, are all more or less dependent upon the shape of the process and arches. In most people there is a good balance in the upper part of the face; indeed, it is rare to see a person in whom the nose, eyes and forehead are not in proper balance. Nearly all the defirmities of the face are, at least a very large per cent of them, in the lower part of the face. The mouth plays an important part in producing the various facial expressions. It is a difficult matter to distinguish whether one is laughing or crying if the face is covered below the eyes. The lips are, of all the features, the most susceptible of action, the most direct index of all the feelings. We can have no better illustration of how much depends on the function exercised by the mouth, for the particular character impressed on the lower part of the face when the lips are in motion, than to watch the features of a public speaker engaged in his vocation. In the most impassioned discourses the action is almost entirely confined to the lips and associated muscles of the mouth.

The type of the individual and the state of intellectuality is determined in a great measure by the characteristic shape of the process and dental arches. For illustration, I would call your attention to the contrast that exists between the skull of the negro and that of the European, caused by the inordinately larger size of the jaws and the projection of the teeth and process in their relation to the brain case in the former, while the well-formed skull of the latter is distinguished by having the jaw, process and dental arches placed in a harmonious relation with the brain case. My conclusions are that the deformity in the face will be proportionate as the process and dental arches are abnormal; for what is beauty but the absence of deformity?

Function number five—to form the interfortifications against the accidental entrance into the mouth and throat of foreign substances. There is not much for me to say regarding this function.

The shape and location of the dental arches are such that they prevent anything from entering the mouth or throat by accident should the substance pass the lips by force or otherwise. This is a wise provision on the part of nature, because there is no question that in many instances foreign particles would be forced into the throat that might result disastrously to the unfortunate victim. The evil results that are liable to follow the premature loss or the long retention of the temporary teeth may be classified as follows:

First—Impairment of the occlusion and masticatory apparatus in the temporary denture.

Second—Lack of development in the jaws and process.

Third—The impaction of the permanent teeth.

Fourth—Deflection of the permanent teeth during their eruption.

Impairment of the occlusion of the masticatory apparatus in the temporary denture.

The occlusion of the temporary teeth is not unlike the occlusion of the permanent teeth. The upper arch describes a larger circle than the lower arch. The labial and buccal surfaces of the upper teeth overhang the lower teeth, the cusps of the molars interlocking. The arches describe a parabolic curve. The teeth are all in lateral contact. The arrangement is such that it will give each tooth the support of two neighbors in the same arch and the support of the relative teeth in the opposite arch. By such an arrangement of the teeth the maximum amount of grinding surface is provided. It is necessary that this condition of the teeth be maintained. Should a first temporary molar be prematurely lost the occlusion not only will suffer from its loss, but the teeth on either side will tilt toward the space. Very often the lateral movement will extend around the entire arch, affecting all the remaining teeth. I have observed a few cases where mastication was severely crippled by the loss of a single temporary tooth.

Lack of development in the jaws and process.

I have previously dwelt upon the mechanical assistance rendered by the teeth in the development of the jaws and process. The permanent teeth are larger than the corresponding ones of the temporary set, except the second bicuspids. The permanent teeth, therefore, require a larger alveolar arch and the alveolar arch requires a correspondingly large jaw-bone. The temporary teeth are designed to remain in position until succeeded by the permanent

ones, for they serve to retain the space and to allow the corresponding permanent set to wedge into position. As previously stated, the dental arches move forward in phalanx during the formation and eruption of the permanent molar. When the upper second temporary molar is permanently lost and the upper first molar makes it appearance, it meets with the resistance of the tuberosity of the upper jaw on its distal side, while no resistance is offered on the mesial side. The erupting molar will move forward into the space previously occupied by the temporary molar. There will be no development, and the jaw will be short mesiodistally the extent of the width of the lost molar. The upper temporary cuspids are more frequently lost prematurely than any other of the temporary teeth. When they are lost the eruption of the first molar will force the temporary molars mesially and will impinge upon the space of the permanent cuspids, and sometimes will obliterate the spaces entirely. In such cases there will be a lack of development and a consequent irregularity. The same process will occur should any of the temporary teeth be prematurely lost. The development in the jaws and process will be deficient to the extent of the width of the tooth lost.

The impaction of the permanent teeth.

Teeth are said to be impacted when they form in the jaws and are prevented by some cause from erupting. Perhaps the lower second bicuspids are more often impacted by the premature loss of the temporary teeth than any of the other teeth. The loss of the second temporary molar will allow the first permanent molar to move forward into the space, while the first bicuspid will move distally and hold the crown of the second bicuspid, preventing its eruption. The long retention of the upper cuspids will sometimes cause impaction of the permanent cuspids. The failure of the roots of the temporary teeth to resorb prevents the advance of the crowns of the permanent teeth. The stimulus imparted by the formation of the root and the inherent tendency to erupt produces new growth of bone, which in many cases completely envelops the crowns and holds them securely in the jaw.

Deflections of the permanent teeth during their eruption.

The crowns of the permanent teeth should occupy a position beneath or adjacent to the roots of their temporary predecessors. As the crowns of the permanent teeth advance, the roots of the

temporary teeth are resorbed; when finally the temporary crowns are removed, the permanent teeth advance and assume the positions previously occupied by them. Sometimes it so happens, from various causes, that the roots of the temporary teeth are resorbed. The advancing tooth is deflected from its course and forced to erupt out of correct position. Many times a small spiculum of the root will be sufficient to deflect the course of the erupting tooth. When a tooth erupts out of its proper position on account of the retention of a temporary tooth, it cannot be moved into alignment without creating more space, except in the case where the width of the temporary tooth is equal to the width of the tooth that displaces it. For instance, should the upper lateral incisors be deflected lingual to normal, there will not be sufficient space to move them into alignment, for two reasons. The teeth posterior to the laterals will move forward and occupy a portion of the space intended for the laterals, and there will not be sufficient development because of the absence of the wedging influence of the laterals.

In conclusion, let me urge the necessity of treating the temporary teeth with every consideration. On the normal retention and the normal loss of the temporary denture will depend, in a great measure, the future usefulness of the permanent denture.—*Dental Summary.*

DENTIFRICES AND MOUTH-WASHES. By Geo. W. Cook, B.S., D.D.S., Chicago, Ill. Dentifrice, in the last analysis of the word, may mean either a tooth powder or a tooth wash. The above title is given in about the way the profession of dentistry uses the two terms. A tooth powder, as we at the present time understand it, we always call a dentifrice. We apply the term mouth-wash to a liquid remedy that is capable of removing any foreign substance from the oral cavity. Its use has become quite frequent since the discovery of the pathogenic properties of bacteria, and since it has been discovered that a large number of the so-called parasitic form of life are habitual inhabitants of the oral cavity.

Tooth powders, in their original application, were used as a means of removing, or at least keeping, substances from forming on the surfaces of the teeth, lest they remain there and mar the appearance of these organs. Tooth powders, according to history,

as agents for cleaning and brightening the teeth, came into use many centuries ago; and various compounds were prepared by certain races and classes of people for enhancing the beauty of their teeth. Many of the uncivilized races resorted to this means of brightening the surfaces of their teeth to make themselves attractive. From the very earliest data in medical antiquity we find that tooth powders, or something that served that purpose, were used; but at that time, as we have stated, they were used as agents to polish the teeth. Common wood ash and various agents of like character were used to rub on the teeth with sticks; and we might say that the modern toothbrush is the outcome of an attempt many centuries ago to prepare an appliance with which a powder or gritty substance might be applied to the teeth. At that time the use of the powder and brush was confined very largely to the anterior teeth and was only for the purpose of making them ornamental, the users being absolutely unmindful of the deleterious effect they would have upon their teeth. From a study of the subject before hygiene was known, tooth powders seem to have been used with equally as much intelligence as at the present time.

Modern dentistry has brought great revolutionary ideas into operation and in some respects has rendered great service to the race; but with it has come some most deleterious influences for destroying the beauty and long usefulness of the natural dentures. In our modern times, and with modern ideas of beauty and hygiene, has continued the enthusiasm for rendering the teeth one of the ornamental characteristics of the face. Wherever there is a desire on the part of the public in general to go to extremes there comes to the front the commercial instincts of the race, to prepare and sell to the public commercial and secret remedies whether they are a class of commodities that are useful to the people or not. In many respects these remedies are not only useless to the individuals, but sometimes a great detriment, especially if put into the hands of these enthusiastic persons who wish to make their teeth not only useful, but ornamental and attractive

A tooth powder which consists of a chalky substance should be used only for the purpose of removing the inorganic and mucilaginous substances that attach to the surfaces of the teeth. This is a useful and very essential process, but it must be borne in mind that the extremes now practiced will do great harm, for we all are

aware how unintelligent even the dentists themselves are in using tooth powders and other agents for the purpose of cleansing the teeth.

The classic work of the late Dr. Miller on the effects of tooth powder and the brush on the surfaces of the teeth, is so recently before our minds, that I shall only allude to the fact that he demonstrated how easily and how rapidly a tooth might be brushed away by the use of a brush and tooth powder. I need only state that these agents are the greatest possible assistants in the causation of erosion of the teeth. I do not wish to be misunderstood as saying that tooth powders and tooth brushes are the sole cause of erosion, but I do wish to emphasize the fact that they are important factors in this process.

The object of a tooth powder is principally to cleanse the teeth, or in other words, to remove all substances that remain about or between the teeth. Now, as a profession we have left this important branch of our therapeutics to commercial individuals, and it is a well established fact, that wherever commercialism enters the field of dentistry, science must give way. Especially is this true when it comes to medical agents; for scientific therapeutics has never come to the dental profession in a way that has materially benefited it.

We have not had an agent in a great many years that is any improvement over the early attempt at getting up a good common-sense tooth powder. A tooth powder given to the profession about thirty-five years ago was just as good as anything since that time; and, in fact, there are a number of tooth powders that have agents in them that are absolutely deleterious both to the tooth substance and to the mucous membrane. The mixed saliva contains mucous cells with more or less mucin or colloidal substance with which a tooth powder will become more or less a pasty mass, which may contain a large number of bacteria. These microorganisms will soon grow, and there usually is present enough organic material in the mass of glue-like substance to carry on the growth of bacteria. The statement will probably be made that we should incorporate antiseptics with all our tooth powders. Any such substance will filter out of a powder in the mouth in from three to eleven minutes so that not a trace of it can be found. With these facts at our hand, then, the usefulness of a tooth powder can only

serve one purpose, and that is to keep the surfaces of the teeth clean and free from extraneous substances. Now, with the knowledge that these agents will in certain mouths cut away the tooth tissue with great rapidity, it leaves us in doubt as to whether or not we should use them at all.

If a tooth powder is to be used, it should not be used until the dentist has determined just what it contains, especially as to the fineness of the grit. Any tooth powder containing cuttle-fish or pumice should be excluded, as these agents will cut away tooth substance almost as fast as a sand-paper disk. A tooth powder containing 1½ per cent soap will cause, when used twice a day for several weeks, a degeneration of the mucous tissue. The soap from soap bark will cause this last named condition more rapidly than the ordinary castile soap.

The soft tissue cell that is of the most importance to the teeth in the oral cavity is the unicellular glandular epithelium of the mucous membrane. If the preservation of this tissue is not maintained, then our function in giving the best care to this special field is a failure. Our first function is to treat the teeth without in any way interfering with the surrounding tissue; and, when our treatment is of such a nature as to render the function of the mucous tissue about the teeth degenerate, then our treatment is not in accordance with the most scientific phenomenon known to biologists. If we look into the pharmacology of most agents that are used in the oral cavitiy as mouth-washes, we will find that they will, if accompanied with friction, cause degeneration of the mucous tissue. It is quite essential then that the condition for which a tooth powder or mouth-wash is prescribed be given some consideration.

There are incorporated in tooth powders agents that are usually spoken of as drugs. The word drug means a crude remedy used in medicine. Practicing medicine is the art or science of healing disease, especially by the employment of a remedy in the treatment of a disease. With this understanding, a tooth powder would naturally come under the head of preventive medicines. Now it is a question whether or not this branch of medicine should be practiced by specially educated individuals whose trainings have been such as to make them competent to differentiate as to whether an astringent or a stimulant shall be used in a

certain case. If the observer is sufficently skilled, he may determine whether or not a preventive remedy is required. Some questions naturally arise: Shall preventive remedies be prescribed, and under what condition shall they be indicated in mouths in which there are present sound teeth and mucous tissue, and where there are no irregularities, in other words, where there is a normal oral cavity? I should say, by no means need we prescribe antiseptic tooth powders and mouth-washes.

If teeth are not in their normal relation to each other the mucous tissue is not in a normal condition. Then it is the duty of the clinician to study the individual abnormalities and apply such remedies as the case may demand. If it is studied from a physiologic and pharmacologic standpoint it will be possible to reach a base scientific and practical therapeutics. It should be borne in mind that when a tooth powder or mouth-wash is prescribed when there is no specific pathologic lesion present, it comes under the head of preventive therapeutics. In prescribing a preventive remedy it should be prescribed as a specific against the possible occurrence of a specific disease process.

If we accept the biologic causation of disease, we must then agree that a remedy that will prevent caries of teeth will not always prevent diseases that manifest themselves in the mucous tissue, and vice versa. However, it is universally attested that the original use of these remedies was for the preventing of carious conditions of the teeth alone; and, in the effort to prevent this pathologic condition of the teeth, almost every day there are remedies prescribed that may prevent this disease process. But in establishing immunity or preventing decay, the remedy may be of such a nature as to cause pathologic changes in the soft tissues of the parts about the teeth. Any of these agents may not make any appreciable change in the mucous epithelial structure for a considerable time, but the gradual degeneration may at once burst into a flame of pathologic change that may pass into a chronic pathologic state and remain that way until the teeth are completely lost. When these remedies are causing such a condition of epithelial degeneration, they should be withdrawn at once. The misfortune is that these pathologic processes are seldom recognized until the process has reached a chronic state. When that state of pathology has been reached, it

is difficult to know whether the remedy or the bacteria is causing the disease process.

There are many agents that are being daily used and recommended by the dental profession, which, in my hands and attested by various processes of applying them to the epithelial mucous tissue, have proven to be the most essential in bringing about certain tissue changes that are pathologic in their general characteristics. These agents have under certain circumstances proved to be specific in the causation of erosion and may indirectly have caused pyorrhea alveolaris. I have taken large quantites of tooth powders and mouth-washes and applied them to culture medias in various ways. As a result bacteria grew and fermentation increased one-half of one per cent in acidity over the controls that had none of the remedies in them. The length of time that it takes the most efficient disinfectant to act upon the bacterial cell, though even that agent could be applied to the mucous membrane, is so great that one may hope to remove the bacteria from the oral mucous membrane only in a mechanical way, in other words, in washing them out of the mouth. Experiments also proved that, when these most potent remedies were used in the oral cavity, growth did not take place in the culture media as rapidly as they did in the control. We demonstrated, however, that by making a chemical test for the agents used as disinfectants in the mouth, traces could be found in the culture medias showing that they acted rather upon the bacteria after they had been transferred to the artificial media than while they were in the mouth.

With such facts as these before us, we are inclined to repeat a statement formerly made upon this question—that, at the present time there is not a remedy on the market that is capable of acting as a disinfectant to the oral mucous membrane except by mechanical action. Besides, the agents that we look upon as being the most potent in the destruction or prevention of the growth of bacteria, will produce more deleterious effects upon the mucous epithelial structure than they will upon bacterial life. I have proved by the application on a particular tissue of certain agents like thymol, tricresol, formalin in the most diluted solutions, mercury bichlorid 1-1000, boracic acid, and various of the hydrocarbon compounds, by moistening a pledget of cotton and placing it on a particular location and holding it there from one to two minutes

and a half three times a day, that each is the cause of certain pathologic changes in that particular spot, the phenomenon of which did not appear in the tissue in other parts of the mucous epithelium. These pathologic changes differed as much in their microscopic appearance as each individual differed from another. I remember one case in particular where forty-two treatments twice a day, with a two per cent solution of thymol applied along the gingival border or just above the gingiva over a cuspid tooth, produced degeneration of the epithelial structure, into the characteristic mucoid degeneration of tissue that is well described in the literature on degeneration. The same solution was applied in the same location in the mouth of another individual in which there appeared a hypertrophied growth of the epithelial structure; the result differed so characteristically from the other that you would think that the same agent could not possibly have produced the two pathologic changes. So it is a wonderfully complex task to say just what we can or cannot use as a dentifrice.

It only requires a brief consideration to see the adaptive capacity of the tissues of the oral cavity. It would consume so much time even to touch upon this phase of the biologic phenomena, so constantly before us in the study of any condition of the oral cavity, that we cannot discuss this phase of the subject. But wonderful as it may seem, my treating and studying the tissues in the oral cavity and especially around the teeth, has made me wonder if really we know anything about the physiology, to say nothing of the pathology, that comes under our observation. In perfectly normal persons, or we might say those who measure up to the standard of what we call physiologic process, about 20% transfer to the saliva from the tissues and fluids of the body, immunizing substances. The other 80% of these people, so-called normal, have varying degrees of immunity or bacteriolytic action; while a large per cent of the tired nervous people, who do not have the standard normal conditions, are constantly susceptible to one or the other agent as applied to the mucous tissue, and also have a restraining effect upon one class of bacteria, while it practically increases the virulent properties of the others. When I say virulent properties, I mean those properties which are the physiologic type of bacteria.

So it will be seen that in the study of remedies and in applying them in the oral cavity, we cannot lay down any specific rule

whereby we can prescribe remedies as dentifrices, or can recommend their universal use, any more than we can recommend a particular treatment as truly specific in the immunizing or cure of any disease. But I believe that if an individual can be made by us to throw off more water with the salivary and mucous products, so that it will become a more universal solvent of the mucoid and colloidal substance, we will render a greater service to our patients than all the therapeutists could prescribe in a hundred years.

I should like to make two or three suggestions here. First, do not prescribe astringent solutions that will act in a very appreciable manner on the mucous epithelium. Prescribe only stimulants that will act in the very mildest manner, for these two agents are the ones that will cause degenerative changes in the mucous tissue. If you have decided that you must prescribe any of these things, unless they are for specific conditions that exist as pathologic lesions, do so in the mildest manner possible, because I can assure you that their action on the mucous membrane is of greater detriment than the benefits would be. When there is some specific condition for which you prescribe a certain drug, you should know exactly what pathologic changes are taking place in the tissues.

Now, as for tooth powders and tooth pastes, all the difference there is between the two is the addition of a sufficient amount of glycerin to make a thin pasty mass of the powder. I will here append a prescription that was suggested by Dr. C. E. Jones of Chicago, after he had gone over a large number of formulæ, and after he had made up hundreds of batches of tooth powders that are more or less known to the profession. This mass as a powder should never be used except when it has been filtered through two thicknesses of ordinary silk. A powder that will not pass through two thicknesses of silk will cut away tooth substance in the mouths of some people so rapidly that the patient and dentist will become alarmed at the extraordinary development of erosion.

There are times when even an apparently healthy tissue would be benefited by some agent that would stimulate the physical properties of these cellular elements. But the point I wish to make is that we must prescribe certain agents with due consideration as to what effect they will have on healthy tissue cells. The formula that I have given here, prepared in the proper manner, is the only tooth powder out of forty-two different samples tested in the labora-

tory in the last five years that will not produce either rapid degeneration of the tissue cells or produce certain eroded conditions in the mouth of animals as well as in man. The real efficiency of a tooth powder lies principally in its having no effects on the tissues except in a mechanical way.

It will be impossible for me to go into a discussion of mouth-washes, because to my mind this involves one of the most interesting problems in dental therapeutics. Suffice it to say that a mouth-wash should be prescribed, not with a view of rendering the oral mucous membrane free from bacterial life through its action on the bacteria themselves, but that it can possibly operate only as a mechanical agent. If it is only to be used occasionally it can be made stronger. The main plea that I make in this paper is for the preservation of gum tissue, and we cannot preserve this important tissue structure if we use all sorts and kinds of agents, and especially those unknown to us. The time is past for the profession of dentistry to rely upon empirical remedies and practice empirical therapeutics.

... ANTACID TOOTH POWDER.

℞	Magnesii oxidi ... 5.	Forms milk of magnesia with water.
	Calcii carbonatis .. 10.	Precipitated chalk, grit.
	Magnesii peroxidi.. 2.	Oxidizing agent, O is liberated when brought in contact with lactic acid.
	Menthol 0.20	Antiseptic, cooling agent.
	Benzosulphinidi 0.10	Flavor (saccharinum).
	Olei menthae pip...0.20	Flavor aromatic.

M.

Sig. Apply with brush.

Mix first three ingredients together in mortar. Dissolve the benzosulphinidum and menthol in the oil and while adding to the powder, triturate thoroughly.—*Dental Register.*

SCIENCE AND EMPIRICISM IN ORTHODONTIA. By J. Sim Wallace, D.Sc., M.D., L.D.S., London, Eng. Perhaps it may be useful at the outset of our career to take a somewhat general survey of our subject with a view to seeing if possible where we stand. It may be difficult to do so, for in reading the writings of some authors we might be induced to believe that we had reached

the zenith of human achievement in the science of orthodontia, whereas when we read the contributions of others we may feel somewhat inclined to think that the *science* of orthodontia does not exist, that it is, in fact, to all intents and purposes a *terra incognita*. Perhaps the latter belief prevails, at least in this country, and I assume that it is on account of our admitted lack of knowledge of at least a great part of the subject that we have formed ourselves into a society for the study of this science.

That the empirical art of regulating teeth has made considerable progress few will doubt, that the ingenious inventions and appliances which we have at our disposal are fascinating because of their elegance and excellence will, I think, be freely admitted, even though we cannot claim nearly such a large share in the evolution of these appliances as our transatlantic colleagues. On the other hand, many will probably question whether we know much about the pathologic or abnormal processes which eventuate in the malpositions of the teeth, nor can it be said that we are all agreed as to the causes which give rise to these pathologic processes. Yet if we do not, can we look on orthodontia as it exists as a science? Would any one of us attempt to treat a case of irregularity associated with mouth-breathing, without removing the cause which gave rise to the mouth-breathing, or at least without restoring the function of respiration through the nose? Now leaving out of consideration the fact that we are by no means all agreed as to how mouth-breathing brings about the malpositions of the teeth typically associated with mouth-breathing, whether it be due to lack of development of the nose from want of function or from negative pressure, or whether it be primarily from undue pressure of the lips and cheeks, or whether when the mouth is kept open the tongue is unable to dominate the normal developmental processes. Leaving aside all this, I say, would we be acting scientifically if we allowed the cause which brought about the irregularity to continue to act during our efforts to regulate the teeth, or even after we had corrected the malocclusion? With reference to this class of irregularities Dr. Angle says: "It seems quite probable that all of these conditions have been gradually brought about as a result of mouth-breathing; at least, in a very large percentage of cases. It therefore becomes apparent that treatment should first be directed toward the restoration of normal breathing,

and it is now the belief of the author after much experience with these cases that failures in maintaining corrected occlusion will sooner or later follow unless normal respiration be established. Treatment of the occlusion without attention to the nasal tract is but the treatment of symptoms without removal of the cause."

If this be true, what must we consider the scientific basis of our treatment? Assuredly it is not occlusion or malocclusion, for even though the occlusion is corrected failure will sooner or later follow if normal respiration be not restored. Surely it is evident that the cause of the irregularities and malocclusion is, or ought to be, the scientific basis of our treatment. This by implication embraces the more general truth which it is my special desire to enforce, namely, that etiology is, or ought to be, the basis of our scientific treatment, not only in the 13 per cent of cases associated with month-breathing, but also in the 87 per cent of cases which are not associated with mouth-breathing. For if we do not remove the cause when we restore normal occlusion, or if the cause is not removed in those 87 per cent of cases, I say emphatically that in general the corrected occlusion will sooner or later result in failure, for we shall have been treating symptoms without removal of the cause. I will go further and say that it frequently happens that the restoration of normal occlusion may still further retard the developmental processes which should normally help to correct the malocclusions. I will not elaborate this point at present, but would like to repeat my contention that in order to claim orthodontia as a science we must know the etiology of the malpositions of the teeth. I would like also to repeat here my conviction that "the most essential adjunct to all mechanical appliances is to have them working coordinately with the natural forces which regulate the teeth."

The next subject I desire to touch upon is the question of diagnosis, or the recognition of exactly that with which we have to deal. In recent years the first permanent molar has come in for at least its fair share of attention, and rightly too. It is now regarded as a most important tooth, not only on account of its own proper function, but on account of its value from the point of view of diagnosis; it is said, in fact, that "the key to occlusion is the relative positions of the first molars." Unfortunately, however, the first molar has a terrible habit of being out of its proper place. It may

occlude mesially, distally, labially, etc., with its antagonizing tooth. However, it is in normal occlusion, according to Dr. Angle, in about 63 per cent of cases, and his largest division of irregularities comprises those in which the first molars are in so-called normal occlusion. It does not appear to have occurred to those who make this shifty tooth the key to diagnosis that, although it may be in normal occlusion, it can be and generally is displaced forward in both upper and lower jaw. That, in fact, there generally is a mutual lack of development in both upper and lower jaw, and that, therefore, though the mutual relations of these teeth remain correct, they may be in an abnormal position in every other way. Indeed, this is almost invariably the case, and if we but think how the body of the jaw is developed we see that the fact of the crowding in the front of the mouth must always invariably be the result or concomitant of the abnormal, or too anterior position of the first permanent molar and not of its normal position. Surely, knowing as we do how the jaws develop, we are forced to conclude that if there is crowding the anterior displacement of the molar teeth must be practically equal to the amount of crowding. Now suppose we did restore correct occlusion in a set of teeth in which the molars were in so-called normal occlusion, but in which they were displaced forward, what would happen? Simply this, we would get every tooth into a position of similar anterior displacement to the body of the mandible or maxillæ. For it is the teeth that are moved by our ordinary mechanical appliances, and the development of the body of the jaw is in no way stimulated; indeed, the increased space allowed by the expansion of the arch prevents the tongue pressing mandible and maxillæ forward, and thus stimulating the growth of their bodies posteriorly. Now double anterior displacement of the dental arches, or rather insufficient development of the mandible and maxillæ, or perhaps of both combined, is distinctly ugly. The oral orifice is made to look large, the lips to project and the general appearance to simulate our simian ancestors rather than the ideal man. But this is not all, nor indeed in some slight cases would it be of much consequence. But the coming into position of the third molar tooth still further augments the ugly deformity, even though the occlusion should remain normal, which, however, it does not, at least so far as my experience goes. It may be said that an ex-

pansion arch anchored, let us say, to the molar teeth, tends to force the molar teeth back while pulling the anterior teeth forward. It is obvious, however, that the resultant of all the forces which may be got from the expansion arch cannot pull the jaws forward *en masse* and stimulate their development posteriorly. Consequently, there is no more room given into which the molars may be pressed back, and all that results is a fruitless fight against the abnormal force which actually translated the molars forward and produced the crowding anteriorly. I think it must be evident to those who recognize the method of the development of the jaws which, I think, England claims to have worked out, that pushing some teeth in one direction, and others in the opposite, does not tend to develop the body of the jaws or of the mandible at least, for there is no interstitial growth.

A somewhat similar consideration may here be referred to. The idea that the wedging of the teeth is necessary to the development of the dental arches is wholly erroneous. Here is a model of what may be regarded as a typically well-developed arch, and you will see that wedging could have had no part whatever in its production.

It will be seen that if the spaces between the upper temporary teeth had not come into being, if, in other words, the measurement from the mesial surfaces of the first permanent molars round the dental arch had only been the sum of the measurements of the mesiodistal diameters of each tooth, the distance would have been about three millimeters less on each side. This would represent pretty nearly the amount that the maxillæ were lacking in posterior development and, consequently, the amount of anterior malposition of the first permanent molar. I do not think that the extreme amount of anterior displacement of the first permanent molar referred to by Mr. Northcroft in a recent paper is usual. He says that the first upper molar comes "forward and downward till the [malar] process blends with the ridge formed by the anterior buccal root, the tooth practically occupying the position once held by the second deciduous molar." It should be remembered also that it is not only the first permanent molar which suffers anterior displacement through the lack of sufficient posterior development of the body of the maxillæ, for under such circumstances the molar process also necessarily remains in a too anterior position; the deposition of bone posteriorly and the absorption anteriorly,

necessarily not having molded the malar process further back than the first permanent molar above which the malar process is normally placed. It should be noted also that the normal occlusion of the temporary teeth necessarily demands the existence of spaces between the upper temporary molars, the upper temporary molars being smaller mesiodistally than the under temporary molars. It should, too, be observed that the normal relation of the temporary teeth is (but for the existence of spaces between the teeth) practically identical with that of the permanent.

Now, ludicrous as this idea of wedging may seem to those who have studied the development of the jaws and dental arches, yet, nevertheless, one of the fundamental assumptions of the modern school of empirical orthodontia is this very belief that the wedging process is necessary in developing the dental arches. And what is more, the mechanical contrivances which some of the adherents of this school advertise so loudly, practically all betray the belief in this primitive idea. They may be able to make an arch of teeth appear normal when models are taken of these arches. They may be able to map out a whole dental arch from the measurement of one single tooth. But what use is it if they do not correspondingly develop the base on which these arches rest and readjust or reverse the forces which, in the first instance, brought on the irregularities? Are we justified in assuming that the forces which produced an irregularity will not reproduce them a few years later? When we alter the relation of certain forces, as, for example, when we readjust a simple malocclusion, we expect our efforts to be crowned by success, and we expect rightly when it is simply a case of malocclusion uncomplicated with general crowding or other abnormal condition. But in most cases there is observed some other element and a retention plate has to be employed. Does this indicate that correct occlusion will of itself keep teeth in their corrected position? And if the force which disturbs our efforts, after we have arrived at correct occlusion, is allowed to persist after the retention plate or apparatus is removed, do you believe an irregularity will not recur?

Gentlemen, I do not wish to say more at present, and would only like to draw my remarks to an end by saying that when we consider how intimately the etiology of irregularities is associated with the art of regulating the teeth, we must feel inclined to think

that those who vaunt their methods while ignoring etiology, are surely trying to sell mechanical appliances rather than advance the science of orthodontia. Fortunately, England at least cannot be blamed for advertising mechanical appliances. For, indeed, she has produced but few that are worth advertising. But as an offset to this I will say that England has contributed the lion's share to elucidating the developmental process underlying the formation of the normal arch and moreover has, I claim, elucidated the main etiologic factors in the production of irregularities which give orthodontia a claim to be regarded as a science.—*Dental Record.*

PREPARATION OF PROXIMAL CAVITIES IN BICUSPIDS AND MOLARS FOR GOLD INLAYS. By C. E. Herbert, D.D.S., Los Angeles, Cal. Having noticed a number of the profession preparing cavities for gold inlays without dovetails or retention, depending entirely on the adhesive properties of cement to hold the fillings in place, and trying it several times myself to my sorrow, I now prepare them as described below. I wish to state here that I finish or partly finish all my fillings before cementing in place by driving the gold inlay into the cavity, and that I have a hard time to get them out again in order to set them with cement. There is no possible way of their being dislodged, except in the line of their insertion, and here I depend on the grooves cut in the inlay, cavity, and the cement. In the preparation of these cavities, the buccal and lingual walls must be extended so that the enamel margin of these walls is at right angles to the base or seat or parallel with the axial wall.

The grooves of the occlusal surface should be cut out, forming a step at right angles to the axial wall, and the end of step slightly enlarged buccolingually, or a pit made at the end, or both.

The body of the cavity should be box-like in shape, with lines slightly divergent, always having in mind the removal of matrix or wax model, toward the occlusal. The word parallel as used here meaning almost parallel, with the understanding that the occlusal opening of the cavity is slightly larger than the base of cavity and base of step.

Having the cavity prepared in this manner, take a tapering fissure bur, make a groove in the buccal and lingual walls from base to the

occlusal, which will be dovetail in shape and guide the filling to place when cemented. Having had one filling, without these grooves, pushed out at the cervical by the cement and not discovering it until too late, I always use these grooves if possible. As the margins of an inlay are so much stronger than a gold filling, the enamel can be beveled more freely.

Believing that the profession ought to have some system of preparing cavities for gold inlays whereby the filling is firmly locked in the cavity without the aid of cement, I offer this, not as the only way, but as a very good way, and one that has been very successful in the hands of myself.—*Pacific Dental Gazette.*

MOUTH-INFECTION THE CAUSE OF SYSTEMIC DISEASE. By Arthur H. Merritt, D.D.S., New York, N. Y. There is a general disposition on the part of the medical and dental professions to underestimate the relations which exist between an unclean mouth and many local and systemic disorders of a grave nature. To anyone who has given the matter any consideration whatever, the fact is well known that in the oral cavity there is presented an almost ideal culture media for bacterial life, and that when through neglect or ignorance the ordinary rules of hygiene are not observed, certain local consequences will follow, such as caries of the teeth, deposits of tartar, inflamed and suppurative gums, coated tongue, foul breath, etc. Persons who give little or no attention to a proper hygiene of their mouths are all too common, and I am not now referring to that unnumbered multitude who receive no dental treatment except the occasional extraction of a tooth. Is it any wonder, then, that caries of the teeth is almost universal, that pyorrhea alveolaris claims its victims by the tens of thousands, or that a vast army of nearly 50,000 in these United States alone is giving all its time to the treatment of diseases confined to the limits of the oral cavity? Let us pause long enough to enumerate some of the local phenomena in which bacteria are an etiologic or complicating factor: Caries; pyorrhea alveolaris; the painful and sometimes grave consequences which attend the eruption of impeded third molars; infections which take place through the medium of gangrenous tooth-pulps; infections following slight operations, through the invasion of pathogenic mouth-bacteria; disturbances which are caused through the direct action of bacteria upon the

mucous membrane of the mouth and pharynx, as the result of the lowered vitality of these parts. In fact, it may be said that all the disease phenomena occurring within the oral cavity are directly or indirectly traceable to bacterial activity.

Systemic Effects of Oral Sepsis.—Let us now inquire as to the systemic effects of some of these local results of oral sepsis. Myriads of these organisms find their way into the alimentary canal with every ingestion of food. Miller has estimated the number of cultivable bacteria found in one unclean mouth at 1,140,000,000, and that 30 per cent of the bacteria in feces are derived from the mouth. It is an established fact that in a majority of cases the gastric secretions do not interfere with the passage of bacteria into the intestines or with their power of development, and thus in many instances microbes exercise a pernicious influence upon digestion. As the result of the fermentative processes which they induce, substances may be formed which may so irritate the mucous membrane of the stomach as to produce catarrhal inflammations. These fermentations may also result in the formation of toxic substances. Many germs, more or less pathogenic, are taken up by the mesenteric glands and carried into the circulatory system. In fact, it may not be too much to say that in many cases of malnutrition the sole cause is a filthy mouth. A case which came under my own observation will illustrate this point:

A young woman presented herself to have a carious tooth filled. An examination revealed the presence of several such teeth, all more or less covered with a slimy deposit; the gums were inflamed and bled upon the slightest provocation, and there was in addition an ill-fitting bridge. Upon inquiry I learned that for several years she had been a sufferer from digestive disorder, and for a considerable period of that time had, by the advice of her physician, siphoned out her stomach daily before meals. Her anemic and ill-nourished appearance was ample evidence of the truth of her statement. I ventured the assertion that she could never hope to be well with a mouth in a condition such as hers. With her cooperation I undertook the establishment of normal sanitary conditions in her mouth, filling the carious teeth, inserting a well-fitting bridge, and instituting a system of oral prophylaxis. Her symptoms began to improve at once, and nine days after she was dismissed, all symptoms of dyspepsia having disappeared, she dis-

continued the use of the siphon, her weight meanwhile having increased several pounds.

A significant feature of this case was that her physician, a man of international reputation, had made no inquiry concerning the condition of her mouth, though the odor from her breath was intolerable.

Everyone is familiar with the disturbances which so frequently attend infantile dentition. All symptoms such as inflamed and swollen gums, impaired digestion, increased temperature, malnutrition, convulsions, etc., are directly traceable to the activity of mouth-bacteria, and may be prevented by the institution, during that period, of a rigid system of oral hygiene.

Though there is still some diversity of opinion, it is asserted by recent investigators that tubercular bacilli which may be ingested are able to penetrate the intact intestinal wall through the glands and reaching the thoracic duct, which they do as readily and as rapidly as food elements, they follow the same route as the latter, and hence they can readily infect the lungs and bronchi. Investigations have also shown that tuberculosis in cows is contracted by the intestinal route.

In the light of this evidence some of our preconceived ideas of how the tubercular bacillus enters the body in pulmonary tuberculosis will need readjusting. The micrococcus of sputum septicemia, which is found in greater or less numbers in the oral cavity, is regarded as the most frequent, if not the sole, excitant of lobar pneumonia, and it is probable that in many instances the infection proceeds from the mouth. In a study of upward of 300 cases of cervical adenitis, Dr. F. A. Donoghue of Boston has expressed the opinion that many of them were the result of mouth-infection—which in children was frequently associated with marked constitutional symptoms—and cites a case of submaxillary adenitis with a leucocytosis as high as 43,000.

Though a host of other instances might be cited showing the far-reaching consequences of oral sepsis, enough has been said to show that in the neglected oral cavity there is present a most dangerous source of infection, and one which has by no means received the attention which its importance demands. My purpose in calling attention to a few of the more obvious systemic results of mouth-infection is to show that there are present in every mouth,

in greater or less numbers, germs which are inimical to health; that such germs when taken into the stomach—as they are with every ingestion of food—are not destroyed by the gastric secretions; and that they find their way into the circulation by the intestinal route more readily and quite as frequently as by any other known way.

Could any greater emphasis be given to the importance of oral hygiene? If all or nearly all of the diseases occurring within the oral cavity may be ascribed to the direct or indirect activity of bacterial life, and if this same condition is responsible for systemic disorders of a grave nature, what higher service could we render our patients than to see to it that they are made to realize the importance of a clean mouth. But until an organized effort is inaugurated to educate that proportion of the general public which gives little or no attention to oral hygiene, the dental profession will not have fulfilled its mission. And where could such a movement more properly have its origin than in the National Dental Association? I believe that this society should officially coöperate with the Committee of One Hundred, of which Prof. Irving Fisher of Yale University is the president, and lend it every assistance within its power in its efforts to establish at Washington a Federal Department of Health. This projected organization has already had the approval of the American Medical Association and of the American Public Health Association. It should also have the official approval of the National Dental Association, and representations should be made to it of the important relation which oral hygiene bears to the national health.

It has been said that during a single census period in this country twenty millions of preventable deaths occur. How far mouth infections are directly or indirectly responsible for these appalling figures no one can say, but Dr. D. D. Smith of Philadelphia is authority for the statement "that no greater good could come to humanity than the full recognition of the dangers from this insidious, prolific and virulent infection in the human mouth" and that the adoption of the oral prophylaxis treatment, as outlined by him, would "result in immediate and marked improvement to general health, and in a notable increase in the average duration of human life."

If this be true (and who shall gainsay it), it may safely be said

that into the hands of no specialty of medicine has there been thrust greater responsibilities than into those of dentistry. Its duty by birthright is not only to combat the ravages of dental disease, but that higher achievement—and the final goal of medical science—the prevention of disease, not only within its own field, but in the larger one of general medicine.—*Dental Cosmos.*

Poisonous Matches.—Whatever may be said of the inconveniences or offensiveness of the old tinder-boxes, the modern match can hardly claim to be above criticism in regard to hygienic considerations, although its extreme convenience must be admitted. Indeed, the lucifer match has become an absolute *sine quid non* of existence. It is a pity, however, that, like the modern explosives used in firearms, it cannot be made smokeless, or better still to give off products of combustion which, hygienically speaking, may be disregarded. Everyone knows how pungent and offensive are the fumes of the modern match, and when the composition of modern matches in general is considered this is not surprising. Among the ingredients used, either on the match itself or on the rubber on the box, are phosphorus, sulphur, antimony sulphid, red lead, mercury, sulphid and lead chromate. The ignition and combustion of the match therefore result, according to the combustible materials entering into its composition, in the copious evolution of sulphurous and phosphoric acids or fumes containing lead, antimony or mercury, all of which are decidedly poisonous. The amounts in each individual match-head may be small, but there are occasions when the number of matches so used is great, or when the space in which they are ignited is limited. It would not be surprising to find, for example, that in the atmosphere of the smoking room or of the smoking concert hall or of the railway carriage the presence of these poisonous products could be distinctly detected, and if that is the case it is obvious that they may find their way into the human organism. The worst offender appears to be the match the tip of which contains phosphorus, because the whole of the phosphorus in that case is burnt, whereas in the safety match, which is generally a wooden one, there is little or no phosphorus burnt, the phosphorus, the igniting agent, being upon the rubber of the box. But the match-head without phosphorus may contain lead, antimony, barium or cyanids. It is clear from all this that the modern match, in spite of its great advance on the tinder-box, is capable of considerable improvement, especially having regard to the fact that its combustion gives rise to the formation and distribution of poisonous fumes and gases.—*The Lancet.*

The Dental Digest.

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Where All Communications Should be Addressed.

Editorial.

DENTISTRY AND THE PUBLIC PRESS.

That the profession of dentistry is receiving recognition and favorable comment in the public press is a fact too conspicuous to be unobserved. In a recent issue of the Chicago *Record-Herald* there appeared an editorial on "American Dentistry," in which the writer referred to the recent advances made in dentistry in this country, such as improved crown and bridge work, the wonderful corrections of dentofacial irregularities, the use of the X-ray, more rationalism in our therapeutics, and the most recent improvements in operative procedure. We quote from the editoriial as follows: "The improvements in filling cavities is especially interesting, as many sufferers will be overjoyed to learn that they can now have a gold filling adjusted to a cavity while they are walking around town and attending to their business.

"In order to accomplish this marvel the dentist takes an impression of the cavity in wax, makes a mold from the wax and pours melted gold into the mold. When the patient calls again the gold filling is cemented in the cavity in a moment and without pain. The idea is not entirely new, though the execution is. Such 'inlaid' fillings have been made with porcelain for years, but the trouble with gold was that it would shrink in cooling. Now, however, the shrinkage is prevented by air pressure, and the long-desired achievement has been accomplished. If science will now only find a way to prepare a cavity without pain, dentistry must become immensely popular.

"These dental triumphs recall the rude dentistry of old times—

not only the lead-filled cavities of ancient Egypt, but the bungling attempts of a century or two ago. The American people have become accustomed to a likeness of George Washington, with a peculiar puffiness of the upper and lower lips, which is due to a set of false teeth made in Paris from a measure of his mouth taken, it is said, by himself with a tape line.

"Dentistry cannot be too highly appreciated. It is said that no man is any younger than his arteries, and it might be said with equal truth that no man's health is any better than his teeth. Poor teeth mean poor digestion, poor digestion means poor nutrition, and poor nutrition leaves the whole body a prey to disease and decay."

This makes good reading matter, especially when written by a layman and found on the editorial page of one of our leading daily papers.

The Illinois State Dental Society recently held one of the most successful meetings in its history. On the last day of the meeting there appeared an editorial in the Springfield *Daily News* on "The Teeth." The writer, after emphasizing the importance of the teeth, discussed at length the care and method of brushing the teeth and gums. There was no reference made to the meeting of the dentists of the state; yet it was plain to those who were present at the session of the previous evening that the editorial must have been inspired by Dr. G. V. Black in his discussion of a paper on the importance and care of the natural teeth.

Truly the dental profession has broadened and advanced until to-day it stands among the so-called high professions or callings in social life. Its deserving members are given consideration accordingly. They command respect for their learning and skill and honor for the high and valuable aims of the profession which they represent, and are treated accordingly in every community. There never was a time in the history of dentistry when men, and we must add women, were more alert to their professional duties and were accomplishing more for humanity than at the present time. This accounts for the deserved recognition which our profession is gradually but surely receiving by the public press.

J. P. B.

Obituary.

WILLIAM H. EARLES, a dentist of Milwaukee, Wis., died suddenly April 29, 1908.

W. D. WORLEY, 61 years old, a well-known dentist of Craig, Mo., died April 30, 1908.

WILLIAM E. VAN ORSDELL, 67 years old, a dentist of Philadelphia, died April 28, 1908.

J. T. MORRIS, 63 years old, a well-known dentist of Hot Springs, Ark., died April 6, 1908.

E. M. PACKARD, a veteran dentist of Atlantic City, N. J., died of pneumonia April 8, 1908.

WILLIAM F. MITCHELL, 43 years old, a dentist of Aurora, Ill., died after a long illness April 9, 1908.

E. EMIL KOEHLER, 31 years old, a dentist of Galveston, Tex., died from appendicitis April 29, 1908.

JOHN DUNMAN PEARSE, 49 years old, a dentist of Chicago, Ill., died of cerebral hemorrhage April 13, 1908.

DEWITT SPALSBURY, one of the leading dentists of Ypsilanti, Mich., died suddenly of apoplexy April 27, 1908.

IRA KEZERTEE, 83 years old, for nearly half a century a practicing dentist of Oshkosh, Wis., died April 17, 1908.

FRED S. DUNGAN, 29 years old, a dentist of Indianapolis, Ind., died of pneumonia and heart failure April 19, 1908.

T. C. MARIS, 76 years old, a dentist of Malta, O., died April 7, 1908.

W. B. TOWNSEND, 38 years old, a leading dentist of Meadville, Pa., died April 10, 1908.

IN MEMORIAM.

STEPHEN THOMAS BEALE, M. D., D. D. S.

Died, at his residence, Tulpehocken St., Germantown, Philadelphia, Nov. 22, 1907, after a lingering illness, Dr. Stephen Thomas Beale, in the sixty-fourth year of his age.

The announcement of the death of Stephen Thomas Beale, although not wholly unexpected, was received with expressions of deep sorrow by the wide circle of friends to whom his estimable personal qualities had endeared him. While he had been a patient sufferer for a long time, his illness was not regarded as alarming until ten days previous to his demise, when a decided change for the worse became apparent, and he sank rapidly. Although physically weak, his mind remained unimpaired to the last moment, dying in the full fruition of his mental powers and sur-

rounded by his family and near relatives. Death came quietly and peacefully.

Dr. Beale was born in Philadelphia, Pa., Dec. 7, 1844, and was educated in private and public schools of his native city. Immediately after this he began the study of dentistry under his father, the late Stephen Thomas Beale, M. D., D. D. S., whose laboratory was one of the foremost schools of instruction in this city prior to the establishment of dental colleges. Here his natural mechanical ability enabled him to acquire a valuable and thorough knowledge in the various arts of prosthetic technique, and he soon became proficient in the manufacturing of porcelain carving for plain and sectional block teeth, also the refining and smelting of precious metals, the making of metallic plates, the manufacturing of alloys for filling purposes, nitrous oxid gas and the hardening and tempering of steel for various styles of instruments, all of which work was formerly carried on in his father's laboratory, and proved in later years of inestimable value to him. He matriculated at the Philadelphia College of Dental Surgery and was graduated therefrom in the class of 1866-67, and thereafter was associated for years with his father, whose extensive practice covered a period of over fifty years, and to which he and his brother, the late Alonzo Potter Beale, D. D. S., lecturer and demonstrator on prosthetic technique at the Pennsylvania College of Dental Surgery, and his eldest son, Rupert Griscom Beale, D. D. S., eventually succeeded. By careful and conservative methods he maintained the high standard of work established by his father, and at the death of his brother the arduous duties of his practice increased twofold. His remarkable energy and indomitable will, combined with his marvelous powers of endurance, enabled him to follow his profession closely and conscientiously. His rapidity and capacity for work were surprising. He was a sympathetic operator, gifted with a sensitive and gentle touch. He was skilful, enthusiastic, progressive, liberal in imparting knowledge to those who sought his advice. Doubtless, the close and earnest pursuit of his profession was the prime factor in undermining his health. About five years since, in accordance with the advice of his physician, he limited his practice to three hours a day, and finally retired from professional work in the summer of 1906. Although not active in dental societies, yet his connection with the profession from the time of his entering upon its arduous duties has been one of entire devotion and zeal in the discharge of its obligations and in furthering its advance to a proper place among the liberal professions. As an operator he upheld the higher artistic ideals and was gifted with more than ordinary ability. His large and lucrative practice covered a period of thirty-five years, during which time he enjoyed the confidence of a large clientele.

Dr. Beale came from good English Quaker and Scotch Covenanter stock. He was born at 335 Walnut St. (present No. 1117), in Philadelphia, Pa. He was the son of Stephen Thomas Beale, M. D., D. D. S., a celebrated physician and dentist, one of the founders of the Pennsylvania Association of Dental Surgeons, and also of the Philadelphia College of Dental Sur-

geons. His office has had a continuance of over sixty-eight years, the practice having been carried on by father, two sons and at present by three grandsons, Dr. Rupert Griscom, Dr. Clifford Donaldson and Dr. Earle Thomas Beale. His paternal grandfather was one of Wellington's soldiers, and his maternal great-grandfather was Captain William Donaldson, a brother of Arthur Donaldson, who, in 1776, laid the chevaux de frise in the Delaware to prevent the British from coming up the river to Philadelphia. On his mother's side he was also descended from Andrew Griscom, one of the first purchasers of land from William Penn, and from Corporal Mark McCord, who was wounded in the battle of Germantown and died at Trenton, N. J., from his wounds. He was a great-grandnephew of Betsy Ross, maker of the first American flag, and his patriotism was shown when as a lad he enlisted in the emergency corps of 1863 during the Civil War. He was sworn into the United States service in the Thirty-third Pennsylvania Volunteers, "Blue Reserves," and was under fire as a corporal in several engagements at Oyster Point, Carlisle and Hagerstown. His blouse sleeve being shot through at the Hagerstown skirmish caused his name to be incorrectly reported among the list of wounded.

Dr. Beale married Isola Earle Smith, who is a second cousin to the late Lord Julian Pauncefote, former British Ambassador at Washington. He and his wife and family enjoyed the delights of travel, reserving two months during each summer for recreation. He was especially fond of sea voyages and made numerous trips abroad, visiting the famous galleries of art in London and on the Continent. He also traveled many times to Canada and Newfoundland and crossed the United States from the Atlantic to the Pacific.

In private life Dr. Beale was a most warm-hearted and genial companion, modest in disposition, steadfast in friendship, of irreproachable character, generous and noble in every impulse of his nature, philanthropic, kind and courteous, and was honored, respected and loved by all who knew him. He leaves a circle of warm friends and a fond and loving family to mourn his loss. He is survived by his widow, three sons and two daughters.

In his death the profession has lost a most efficient and worthy member.

Notices.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry for examination of candidates will be held in Boston, Mass., June 9, 10 and 11, 1908.

For detailed information address the secretary,

G. E. Mitchell, D. D. S.,
Haverhill, Mass.

SOUTHEASTERN MASSACHUSETTS DENTAL SOCIETY.

The annual meeting of the Southeastern Massachusetts Dental Society was held in Fall River, April 15, 1908, and the following officers were elected: Secretary, W. W. Mann, New Bedford; Treasurer, E. S. Jewett, Plymouth; Councilor, A. F. Wyman, New Bedford; Executive Committee—Drs. F. S. Faxon, J. L. McCarthy and F. W. Sproul, all of Brockton.

PENNSYLVANIA STATE BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia, Music Fund Hall, 808 Locust St., and Pittsburg, Pittsburg Dental College, Pride and Bluff Sts., June 10-13, 1908.

For application papers or information address

N. C. SCHAEFFER, D. D. S.,
Secretary Dental Council, Harrisburg, Pa.

OHIO STATE BOARD OF DENTAL EXAMINERS.

The regular semi-annual meeting of the State Dental Board of Ohio will be held in Columbus, June 16, 17 and 18, 1908.

At the present time the board cannot accept a license from the Board of Examiners of another state. Applications must be accompanied by the fee of $25 and should be in the hands of the secretary not later than June 6.

For further information and application blanks, address the secretary,

F. R. CHAPMAN, D. D. S.,
305 Schultz Bldg., Columbus, Ohio.

ILLINOIS STATE DENTAL SOCIETY.

The forty-fourth annual meeting of the Illinois State Dental Society was held in Springfield, May 12, 13, 14 and 15, 1908, and officers for the ensuing year were elected as follows: President, Arthur D. Black, Chicago; Vice-President, E. F. Hazell, Springfield; Secretary, R. J. Hood, Sparta; Treasurer, C. P. Pruyn, Chicago; Librarian, J. T. Cummins, Metropolis; Committee on Program, J. M. Barcus, Carlinville; Supervisor of Clinics, T. L. Grisamore, Chicago. The next meeting will be held in Danville.

R. J. HOOD, D. D. S., Secy.,
Sparta, Ill.

IOWA STATE DENTAL SOCIETY.

The forty-sixth annual meeting of the Iowa State Dental Society was held in Des Moines, May 5, 6 and 7, 1908, and officers for the ensuing year were elected as follows: President, C. W. Bruner, Waterloo; Vice-President, F. M. Hunt, Des Moines; Secretary, T. F. Cooke, Burlington; Treasurer, G. W. Slingluff, Burlington; Superintendent of District Societies, V. H. Volland, Iowa City. The next meeting will be held in Des Moines.

T. F. COOKE, D. D. S., Secy.,
Burlington, Iowa.

SOUTHEASTERN NEBRASKA DENTAL SOCIETY.

The Southeastern Nebraska Dental Society was permanently organized at a meeting held in Lincoln, April 17, 1908, and the following officers were elected: President, L. S. Gilman, Havelock; Vice-President, M. O. Johnson, Crete; Secretary-Treasurer, E. M. Byrne, Lincoln.

NEW YORK STATE DENTAL SOCIETY.

The fortieth annual meeting of the New York State Dental Society was held in Albany, May 7, 8 and 9, 1908, and officers for the ensuing year were elected as follows: President, Louis Meisburger, Buffalo; Vice-President, B. C. Nash, New York; Secretary, Ellison Hillyer, Brooklyn; Treasurer, M. D. Jewell, Richfield Springs; Correspondent, C. Ferris, Brooklyn.

ELLISON HILLYER, D. D. S., Secy.,
Brooklyn, N. Y.

MONTANA STATE DENTAL ASSOCIATION.

The fifth annual convention of the Montana State Dental Association was held in Butte, April 17 and 18, 1908, and officers for the ensuing year were elected as follows: President, S. Keyser, Butte; First Vice-President, C. N. Reinig, Helena; Second Vice-President, R. C. Purdum, Bozeman; Secretary, F. B. Norris, Helena; Treasurer, H. J. Wirth, Helena. The next convention will be held in Helena.

F. B. NORRIS, D. D. S., Secy.,
Helena, Mont.

TENNESSEE STATE DENTAL ASSOCIATION.

The forty-first annual meeting of the Tennessee State Dental Association was held in Nashville, May 7, 8 and 9, 1908, and the following officers were elected: President, John R. Beach, Clarksville; First Vice-President, C. H. Taylor, Memphis; Second Vice-President, Stanley R. Rich, Nashville; Recording Secretary, Charles R. Tavel, Memphis; Corresponding Secretary, Delan Kinney, Nashville; Treasurer, F. W. Meacham, Chattanooga. Memphis was selected as the next place of meeting.

DELAN KINNEY, D.D.S., Cor. Secy.,
Nashville, Tenn.

PENNSYLVANIA STATE DENTAL SOCIETY.

The fortieth annual session of the Pennsylvania State Dental Society will be held at Philadelphia, in the Bellevue-Stratford Hotel, June 30 and July 1 and 2, 1908.

Every effort is being made to make this the most successful meeting in the history of the society. Distinguished members of the dental profession from all over the United States will take part in the reading and discussion of papers as well as the clinics. The essayists will be Dr. F. B. Noyes, Chicago, Ill.; Dr. Arthur Black, Chicago, Ill.; Dr. G. V. I. Brown, Mil-

waukee; Dr. C. R. Turner, Philadelphia, Pa., and Dr. George Pfahler, Philadelphia, Pa.

One whole day will be devoted to clinics, of which there will be about one hundred.

All ethical members of the profession will be welcome to our meeting. Programs will be mailed on application.

SAMUEL P. CAMERON, Chairman Ex. Com.,
1522 Locust St., Philadelphia, Pa.

SOUTHERN MINNESOTA DENTAL SOCIETY.

At the twenty-third annual meeting of the Southern Minnesota Dental Society, held at Mankato, April 13 and 14, 1908, the following officers were elected: President, Dr. Wold, Jackson; Vice-President, C. E. Conley, Le Sueur; Secretary, C. A. Hintz, Springfield; Treasurer, M. B. Wood, Mankato.

C. A. HINTZ, D. D. S., Secy.,
Springfield, Minn.

WISCONSIN STATE DENTAL SOCIETY.

The thirty-eighth annual meeting of the Wisconsin State Dental Society will be held at La Crosse, Wis., July 21, 22 and 23, 1908. A varied program is being prepared and a good and successful meeting is assured. All ethical practitioners are cordially invited to attend.

For further information address the secretary,

HARVEY N. JACKSON, D. D. S.,
Milwaukee, Wis.

WYOMING STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Wyoming State Board of Dental Examiners for examination of candidates for license to practice dentistry in the state of Wyoming will be held on July 1, 2 and 3, 1908, at the Senate Chamber, Cheyenne, Wyo.

Candidates must be graduates of a reputable college recognized by the N. A. D. E. Applications and the fee of $25 must be in the hands of the secretary ten days before the examination. For further particulars apply to PETER APPEL, JR., D. D. S., Secretary, Cheyenne, Wyo.

CONNECTICUT DENTAL ASSOCIATION.

At the forty-fourth annual meeting of the Connecticut Dental Association, held at Bridgeport, April 21 and 22, 1908, the following officers were elected: President, W. O. Beecher, Waterbury; Vice-President, F. W. Brown, New Haven; Secretary, R. H. W. Strang, Bridgeport; Treasurer, F. T. Murlless, Hartford. Waterbury was selected as the next place of meeting.

R. H. W. STRANG, D. D. S., Secy.,
Bridgeport, Conn.

LATEST DENTAL PATENTS.

882,711. Dental instrument, W. B. Pearsall, Hampstead, London, England.
883,055. Dental impression tray, H. F. Smith, Seattle, Wash.
883,106. Dental appliance, C. C. Galloway, Washington, D. C.
883,232. Dental mouth-prop, N. L. Polinger, New York, N. Y.
883,382. Removable dental bridgework, E. C. Bennett, New York, N. Y.
883,592. Dental cavity-impression tray, T. C. Trigger, St. Thomas, Ont.
884,087. Holder for dental flasks, F. Groshans, Baltimore, Md.
884,159. Dental plate, E. A. Jackman, Hartington, Neb.
884,311. Press for swaging seamless crowns, W. G. Bridge, Boston, Mass.
884,977. Crown and bridge work, C. M. B. Boos, Muscatine, Iowa.

News Summary.

DR. TRUMAN W. BROPHY MARRIED.—Dr. Truman W. Brophy of Chicago was recently married to Mrs. Esther Strawbridge of Morristown, N. J. Dr. Brophy's many friends join with the DIGEST in extending heartiest congratulations.

DIE METAL FOR MODELING COMPOUND IMPRESSIONS.—In cases where it is impossible to secure a plaster of Paris impression a die can be obtained from modeling compound by using the following die metal: Bismuth, 48 per cent; cadmium, 13 per cent; lead, 19 per cent; tin, 20 per cent. This can also be poured into wet plaster of Paris with little or no risk.—O. H. SIMPSON, *Dentist's Magazine.*

CONTOURING ARTIFICIAL DENTURES.—The tone of the voice can be very greatly modified by the form of the denture which is fitted in the mouth. In one such case recently, on finding that the contour of the denture back of the anterior teeth was not correct, I removed the denture, built on wax at the point indicated, removed some opposite the canine teeth, and by a little manipulation was able to correct the defect. The practical side of this subject consists in constructing dentures that will not by reason of their form or contour interfere with normal sound production.—J. H. PROTHERO, *Dental Review.*

INSTRUMENTAL ABUSE OF GINGIVAL BORDERS.—I want to throw out a word of caution on the subject of prophylactic treatment of the teeth, and that relates to the danger of destroying the normal function of the so-called gingival organ. I wonder if we all realize when we scrape around the necks of teeth that the most important point of attachment of the pericemental membrane is the exact gingival margin, the first few fibers which unite the teeth to the gum tissue through the pericementum, and that the moment we destroy these first few fibers we provide a place for the lodgment of mucous secretions and favor the onset of pyorrhea. I have stood

by and watched men using scalers to clean the necks of the teeth, and at the same time they were looking all around the room while the blood was running freely from gums in which there was no inflammation at all.—ELGIN MAWHINNEY, *Dental Review.*

SALT AND OCHRE.—In the laboratory I have a box of salt hanging near the water faucet. This salt is colored with yellow ochre, which can be procured at any paint store. When plaster is mixed the spatula is dipped in the salt and the color is given all at the same time. This is a trifle, but it saves an operation and gives clear color to the plaster when separating later on.—F. B. SPOONER, *Dental Summary.*

A $15,000 DENTIST BILL.—Edwin J. Richardson, the dentist of Brook St., Grosvenor Square, London, is claiming from Mr. Fremlin, a brewer of Maidstone, £570 ($2,775) for dental services rendered his wife. The claim is contested on the ground that the charges are not fair and reasonable. Cross-examined, Mr. Richardson admitted that he had charged as much as £3,000 for putting a mouth in order.—*London Chronicle.*

SPANISH TABLET FOR DR. HORACE WELLS.—The tablet in honor of Dr. Horace Wells, discoverer of anesthesia, sent from Madrid by the Spanish Odontological Society, has reached Hartford, Conn. The memorial is a silver plate surrounded by a wreath of white metal showing laurel leaves on one side and oak on the other. Above is an ancient lamp with light burning, symbolic of the light Dr. Wells has given to the world.

ALCOHOL SOAPS.—Gerson states that the use of tin tubes prevents evaporation of the alcohol in a soft, 50 per cent alcohol soap, and that soap of this kind used with finely pulverized sand dust is an improvement in the technic of disinfection of the hands. The sand dust prevents the evaporation of the alcohol and penetrates with it into the depths of the skin, adding mechanical disinfection to the chemical.—*Journal Amer. Med. Assn.*

DR. CIGRAND CLASSMATES' GUEST.—Dr. Bernard J. Cigrand, president of the Chicago public library board, was the guest of honor, May 1, at a banquet in commemoration of the twentieth anniversary of his graduation from the Dental Department of Lake Forest University. The affair was given by the members of his class of '88, of which he was valedictorian, and by his teachers. All the members of his class were present.

TO TRAIN DENTISTS' HELPERS.—A new institution to be known as the American College of Dental Assistants has been organized in Kansas City and is to be opened May 1. It is to be incorporated under the state laws. So far as is known this is the first institution of its kind to be established. Its purpose is to train young men and women to be dentists' assistants. "The physicians have had nurses for their trained assistants for many years, but dentists have had to get along with any kind of help they could obtain," said Dr. S. H. Behringer. He is to be the president of the new college. All over the country dentists have been talking and writing articles about establishing a school for the training of their assistants, but

it remained for Kansas City to take the initiative step. The average dentist is too busy to "break in" new help and trained assistants are difficult to secure. After a course of four months a degree of graduate dental assistant will be conferred upon the students. In connection with the college a free employment bureau is to be maintained to assist students in obtaining positions. While the school is open to pupils of both sexes, it will especially create a new field of employment for girls.

College Commencements.—Birmingham Dental College, May 4, 15 graduates; Southern Dental College, April 24, 55 graduates; Atlanta Dental College, April 23, 82 graduates; Indiana Dental College, May 12, 48 graduates; Louisville College of Dentistry, May 4, 50 graduates; Baltimore College of Dental Surgery, May 11, 47 graduates; Kansas City Dental College, May 8, 30 graduates; Ohio College of Dental Surgery, May 7, 40 graduates; Cincinnati College of Dental Surgery, May 5, 13 graduates; University of Tennessee, Dental Department, May 1, 18 graduates; Vanderbilt University, Dental Department, May 9, 57 graduates; Texas Dental College, May 1, 10 graduates; Royal College of Dental Surgeons of Ontario, April 30, 38 graduates.

New Plan to Educate Boston Public in Benefits of Dentistry.—A sort of dental museum has been opened for public inspection at South Bay, Boston, Mass., for the principal object of educating school children and their parents to the need of proper care for the teeth. It will be open daily from 10 a. m. to 6 p. m., under the auspices of the Dental Hygiene Council, composed of representatives of the Harvard and Tufts Dental Alumni Associations and other professional bodies. The exhibits include a great variety of models of bad teeth, and a lecturer explains their causes and results. Many photographs illustrate the wonderful things accomplished by modern dental surgery in straightening and making more comely teeth, jaws and mouths.

Examining Board Affairs.—Governor Deneen of Illinois recently appointed Dr. Henry L. Whipple of Quincy to succeed Dr. G. A. Damron of Arcola and Dr. T. A. Broadbent of Chicago to succeed the late Dr. Taylor of Streator.—Governor Gillette of California has appointed Dr. J. W. Neblett of Riverside as a member of the State Dental Board, vice Dr. Garrett Newkirk, resigned.—Dr. Thomas B. Moore of Rising Sun, Md., Dr. A. A. Cotton of Vermillion, S. D., Dr. John R. Beach of Clarksville, Tenn., and Dr. A. W. Burns of North Yakima, Wash., have been appointed members of their respective State Dental Boards.—At the March meeting of the Massachusetts Board 17 out of 70 applicants were successful in passing the examination.—An ordinance regulating physicians, surgeons, osteopaths, dentists and other medical practitioners was passed by the Portland (Ore.) Council, April 22. The principal provision is that all practitioners are required to post their certificates in their offices. It is made an offense for a doctor to practice without so posting his certificate,

and an arrest can be made on this alone without waiting to work up other evidence. It is said that this ordinance supplements the state law in a way that will make it possible for the officials to drive out a large number of undesirable practitioners.

DEVITALIZING PULPS.—Arsenic trioxid, if properly sealed in a cavity and left long enough, is much more satisfactory than pressure anesthesia to both the patient and operator, unless the case be one of emergency, and then, no doubt, pressure anesthesia is the method to use. We were taught in college to leave arsenic trioxid in a tooth from twenty-four to thirty-six hours only. I am quite convinced that allowing such a limited time for the arsenic to do its work is the reason so many young practitioners are sorely tried by having patients return too soon, and upon opening into a tooth find the pulp still vital or partially so.—W. E. O'KEEFE, *Dental Review.*

FITTING GOLD TO WALLS AND MARGINS.—To do this it is necessary that we wedge the gold between the gold previously condensed and the walls of the cavity. In every instance in laying gold against a margin, remember that it is impossible to fit gold perfectly against a wall by driving directly against that wall. It must be a lateral pressure against the gold previously condensed in sufficient bulk to hold the last firmly. We may condense a very small amount of gold into an angle safely, but it is only into an angle that this can be done. The condensing should always be finished against the wall of the cavity by the wedging process.—G. V. BLACK, *Dental Review.*

SODIUM BICARBONATE IN CLEANSING THE MOUTH.—If anyone has not been impressed with the efficacy of sodium bicarbonate in the mouth as a means of loosening up mucoid deposits about the teeth, I wish that some day, when you want to freshen your mouths, and a toothbrush is not available, you would make it a habit of carrying with you in your pocket some tablets of sodium bicarbonate. Dissolve one in the mouth and let the tongue distribute it by a sort of massage, applying the cleansing process by means of the tongue to the surfaces, and you will be surprised to find how clean and pleasant your mouth will feel.—W. V.-B. AMES, *Dental Review.*

BE CAUTIOUS IN DEHYDRATING OR DESENSITIZING TOOTH CAVITIES.—The application of warm air from a charged chip-blower for the purpose of dehydrating or desensitizing a cavity is usually overestimated, and besides the pain inflicted from its sudden and intense heat, it will at times cause a fracture of the enamel if injudiciously used. I employ the cheek as a guide to properly ascertain the degree of heat necessary for the purpose, and keep the chip-blower thus charged with warm air remote or at such a safe distance as would be indicated upon the tooth. You will flinch at the test, and can therefore readily see why the patient flinches. You must remember the cuticle has more resisting power than a tooth, which in its

complex arrangement with nerve fibers is highly sensitive. For this reason do not be over ready to carelessly dehydrate or try to desensitize a cavity in a sensitive tooth. It will cause more harm than good unless you are cautious or have attained that much desired "sense of touch" in moderating the heat, and this will largely depend upon the intuition of the individual.—BERNARD BRAMM, Chicago.

OBTUNDENT FOR SENSITIVE DENTIN.—A simple and safe obtundent for hypersensitive dentin can be made as follows: Mix cocain crystals on a glass slab with a drop or two of oil of cloves or cassia and make a creamy paste. Having the dam applied, dry out the cavity with a bit of bibulous paper and alcohol. Take a pellet of paper, dip into the paste and pack into the cavity with some pressure, allowing it to remain for a short time, when much of the cutting may be done with spoon-pointed excavators. Repeat the application if necessary. It helps amazingly and will not ruin your fine cutting instruments, as will trichloracetic acid.—C. L. BUTLER, *Dental Summary.*

TREATMENT OF THE GUM WITH CHLOROPERCHA BEFORE SETTING A CROWN. —When the gum has been wounded in grinding the root or in reducing the band to the root-level, the acid of the cement works into the wound and gives rise to discomfort similar to that following the application of salt or vinegar. This of course subsides as the cement sets, but is anything but pleasant while it lasts. To overcome the pain thus inadvertently induced, and to prevent such as may attend the setting of the crown, I dry the root and adjoining gum and paint them with chloropercha. The effect is immediate, and the discomfort hardly worthy of mention.—I. C. EDINGTON, *Dental Office and Laboratory.*

SIMPLICITY OF MODERN SURGERY.—Most of the important surgical procedures have been greatly simplified during the last decade. . . . The same simplifying tendency is also seen in the matter of instrumental equipment. A few years ago it was the ambition of every teacher of obstetrics to invent some modification of the obstetrical forceps to perpetuate his fame. The variety of forceps was only limited by the number of professors. According to the most advanced view of to-day a single pair . . . will suffice to meet every need. Likewise, the Sims speculum and its various modifications have rendered obsolete the imposing array of bivalve, trivalve and multivalve specula which formerly encumbered the gynecologist's table. It is another instance of the simplifying influence of the discovery of the true principle underlying a given procedure. Other advances in the mechanics of surgery might be cited. Our older members will recall the wonderful change in technic that was made possible by that simplest of inventions, the hemostatic forceps. The aseptic ligature and the absorbable suture constitute a further great advance. But most valuable of all the recent additions to the modern surgical equipment is the seamless rubber glove. . . . The rubber glove is the last link in the

chain of aseptic defense that limits the source of infection in an operation to the patient himself. The time will soon arrive, if it is not already here, when it will be considered as unpardonable an error in technic to introduce the unprotected hand or finger into an open wound as it is to use an unsterilized dressing or a dirty instrument.—Dr. E. P. Cook, *Illinois Med. Journal.*

Dentist Acquitted.—On Feb. 12, 1908, in the Superior Court at Salem, Mass., a dentist of Gloucester was sued for $3,000 damages, the plaintiff alleging that in extracting a lower left first molar the dentist had infected her either by using an unclean instrument or an impure local anesthetic, thereby causing her great pain and suffering. In summing up the case the lawyer for the defendant showed the probability of plaintiff being infected prior to the time of going to the dentist, and as the latter had used due care and cleanliness it was more than likely to have been a continuation of the old rather than a new infection. The jury fully agreed with the plea of the defendant.

"Something About Casting Gold."—To those using steam pressure by the use of wet asbestos in the cover of the flask this may be of interest: Instead of using the wet asbestos, fill the cover with soft moldine and cut from its center a piece of moldine the size of half a dime, then fill this cavity with wet asbestos. The advantages of using this method are as follows: The cover, when forced down over the hot flask, causes the circumference of the flask to press into the moldine, thereby absolutely preventing the escape of steam or gold. One trial of this method will convince the most skeptical of its merits—absolute results with no loss of gold.—W. O. Fellman, Oak Park.

Exposure of Frauds and the Libel Laws.—As an aftermath of the *Lancet* libel case, a writer in a pharmaceutical journal, in commenting on the law of libel, expresses the opinion that the law in its present form is valuable chiefly to the swindler and sophisticator. The psychic effect of skilfully worded advertising—hypnotism by advertisement, as he aptly terms it—is responsible for much of the misconception that exists in the public mind as to the true value of "patent medicines." The only cure for this evil is education of the public, and yet with the libel law as it now exists an educative campaign is well-nigh impossible. An attempt to expose even the most palpable fraud is fraught with vexation and expense to the exposer. The more subtle forms, to which class the majority of "patent medicines" belong, are so bolstered up with the testimony of paid "experts" that most judges and all juries can be confused sufficiently to render them incapable of giving an impartial verdict. The difficulty of obtaining documentary proof of even self-evident frauds is very great, and many times in fighting the nostrum evil it has been possible to do no more than hint at the fraudulent methods employed. As a rule, the greater the rogue the quicker he is to take advantage of the libel law, and a suit won

by such an individual is a marketable commodity of which he is not slow to take advantage. Hence the need of caution and circumspection in exposing any kind of fraud, and especially any connected with the "patent" and proprietary medicine business, if we wish to further rather than to injure the cause we espouse.—*Journal Amer. Med. Assn.*

MARRIAGES.—Thomas Reid, a dentist of Chicago, Ill., was married to Miss Margaret A. Kerdolff of the same place, April 11.—Dr. Purding, a dentist of Carbondale, Ill., was married to Miss Ella Foley of Carbondale, April 21.—Oliver Harstad, a dentist of Sioux City, Ia., was married to Miss Pearl Schlott of the same place, April 7.—Calvin J. Grant, a dentist of Atlanta, Ga., was married to Miss Theodosia Burr of Atlanta, April 28.—Robert D. McIntosh, a dentist of Joplin, Mo,, was married to Miss Erma Craig of Joplin, in April.—Herbert A. Besse, a dentist of Franklin, Mass., was married to Miss Marjory Alden of Onset Bay, April 20.—Burton E. Loring, a dentist of Palmer, Mass., was married to Miss Myrtice M. Drury of Worcester, April 27.—C. M. Richards, a dentist of Aberdeen, S. D., was married to Miss May Evans of Aberdeen, May 5.—H. H. McDonald, a dentist of Mitchell, S. D., was married to Miss Mary Preston of Mitchell, April 22.—Charles W. Peterson, a dentist of Moline, Ill., was married to Miss Rose Roberge of Rock Island, April 4.—C. B. Mueller, a dentist of Cuero, Tex., was married to Miss Olga Dietze of Cuero, May 6.—Lynford Lardner, a dentist of Oconomowoc, Wis., was married to Miss Janie Glover of Memphis, April 29.

A GERMAN DENTAL DECISION.—According to Consul-General Richard Guenther, the district court at Frankfort recently rendered a decision in a suit between American dentists practicing in that city. The facts in the case and the decision rendered were as follows: A firm in Frankfort composed of two American dentists about eight years ago had taken an assistant, contracting with him that in 1908 he would be admitted to the firm as a member upon certain stipulated conditions, among which was the payment of a considerable sum of money. Should he fail to fulfill the contract the assistant was not to be allowed to practice dentistry for the next two years within a radius of 100 English miles from Frankfort unless he paid to the firm 30,000 marks (about $6,000). The assistant, after unsuccessful negotiations with the firm to permit him to practice on payment to them of a lesser sum, brought suit in the district court for the abrogation of the contract, claiming that such stipulations for preventing competition were against good morals and public utility. He rested his claim upon a decision rendered in a similar suit between authorized dentists by the Supreme Court of the Empire (the highest legal tribunal in Germany), which had so declared. The district court adopted this view and decided in favor of the plaintiff, holding that it is against the public interests when a dentist in his feeling of responsibility, incumbent upon the exercise of his profession, is handicapped by stipulations which treat the professional activity from the point of view that it is solely a money-making matter.

Stipulations of this sort must therefore be considered as being injurious to the public good, and for this reason should not be sustained. This decision will give satisfaction to the public at large as well as to aspiring American dentists. Germany and other European countries offer excellent chances of success to dental graduates. American dentists in good practice in the leading European cities have a larger professional income than their colleagues who practice in the United States.—*Consular Trade Reports.*

IMPLANTATION.—In implantation, replantation, or transplantation a vital physiological union between tooth and alveolus is possible, in the opinion of the author, in those instances in which the tooth is a freshly extracted one. In those cases in which the implanted tooth is an old specimen deprived of pulp and pericementum, union of tooth and alveolus is probably the result of a condensing osteitis, such as is often observed after the extraction of a tooth. The osseous tissue which invades the alveolus surrounds the tooth-root and holds it in place. The osteoclasts, in the presence of a foreign body, become active, and as the result of their attack upon it the root becomes grooved—a grooving or osteoclastic process which is often responsible for the failure of the operation a short time after its performance. Fortunately, however, in many cases the tissues of the alveolus develop a certain degree of tolerance to the implanted root, and thus the osteoclastic process proceeds so slowly as not to interfere with the stability of the tooth for a number of years.—DR. GERSON, *Dental Cosmos.*

CHRONIC ABSCESS WITH SINUS OPENING ON THE NECK OF PATIENT.—A good many years ago, when I began to practice dentistry, a patient came to me, a German, an educated man, who had been in this country but a short time. He had a place in his neck below his collar where pus was oozing out. He said he had had a great deal of trouble with it. He had been treated by one or two good physicians in Germany; it would heal up and then break out again, and so he would go from one physician to another. He had been treated by two or three physicians in this country without much benefit. He told me that some years ago he had a tooth removed on that side and had wondered whether it had anything to do with the present trouble. He did not suppose, however, that it did. He had lost all his molar teeth, but had one or two bicuspids left, and the gums looked natural. Healing had taken place, so that one could not see anything there. But upon closer examination I found the gums were a little flabby, and made up my mind that I would inject cocain into the gum, take a bistoury, and open the gum for an inch and a quarter. This I did and removed two or three roots. I took my syringe, filled it with an antiseptic, forced it down and held cotton on it so that the antiseptic solution would not get out. I then syringed pus out of his neck in considerable quantity. After this he had no trouble.—B. D. BARBER, *Dental Review.*

PATIENT DIES FROM CHLOROFORM ADMINISTERED FOR THE EXTRACTION OF TEETH.—Mrs. Mary List, wife of John E. List, a laborer employed by the Erie Forge Company, died under the most peculiar circumstances shortly before noon to-day at the famiiy residence, 1715 Plum St. Mrs. List had some teeth which required extracting and arranged to have a dentist visit the house and perform the operation, for conditions made it impossible for her to go to the doctor's office, as is the custom. The dentist went to the List home equipped with the necessary instruments and accompanied by a well-known physician who was to administer an anesthetic. Chloroform was used, a little less than a half ounce being administered. Mrs. List passed under the influence of the anesthetic without giving any alarming symptoms. When about half of the teeth had been extracted the physician's practiced eye detected certain signs which caused him no little uneasiness. Without delay both dentist and physician set about to restore her to consciousness and resorted to everything suggesting itself. Notwithsanding their efforts the woman's heart action grew steadily weaker until finally the heart ceased to beat. The administration of so small a quantity of chloroform as was given Mrs. List would not inconvenience to any great extent a person of normal physical condition, but it is evident that Mrs. List was the victim of a very weak heart, though this may not have been known heretofore even to herself.—Erie (Pa.) *Evening Herald.*

ILLEGAL PRACTITIONERS.—A dentist of San Francisco, Cal., convicted of practicing without a license, was fined $50, April 12.—One of the best-known dentists of Peoria, Ill., has been convicted of practicing without a license. The penalty may be a fine of $200, but the case will be appealed.—A young woman employed in a dental office in Boston was fined $50, April 16, for practicing without a license. She appealed and was held in $200 for Superior Court.—A dentist of Grand Rapids, Mich., was bound over to the Superior Court, April 14, for practicing without a license. He gave bail in the sum of $200 for his appearance.—A dentist of Minneapolis, found guilty of practicing without a license, April 20, will appeal.—Three dentists of St. Joseph, Mo., were served with warrants early in May charging them with practicing without a license. They have given bond and will contest.—A dentist of Portland, Ore., April 23, pleaded guilty to the charge of practicing without a license and a fine of $50 was imposed.—Warrants were issued for the arrest of six dentists of Portland, Ore., charged with practicing without licenses, April 13. One of these men for whom a warrant was issued says he intends fighting the matter through to the end, as he feels the attitude taken by the State Dental Board regarding him is unfair, inasmuch as he has been a practicing dentist for nineteen years past.—A dentist of Martinsville, Va., was indicted April 8 for practicing without a license.—Alarmed by the campaign inaugurated by the prosecuting attorney of Seattle, Wash., unlicensed practitioners are preparing to leave that city. April 15 three unlicensed practitioners asked if he would refrain from prosecuting them if they left town. They were promised immunity if they left that section. April 13 two dentists were

arrested on warrants on the charge of practicing without a license. Each gave bail in the sum of $100. April 14 two were arrested on the same charge and gave bail in the sum of $200 each. Several dentists, convicted of practicing without licenses and fined, have been threatened with jail unless they settle. One of these paid his fine in two cases, April 24, the sum totaling $500.

A BILL TO PROTECT CHILDREN.—Efforts are being made to preserve and guard child life and to improve the physique of the rising generation. It is now recognized that urban life—the life that two-thirds of the inhabitants of Great Britain now lead—is inimical to infant life and to the healthy up-bringing of a child. Existence in crowded cities tends to race deterioration, and, consequently, in order to avoid this happening, urban life must be made far more healthy in every respect than it now is. In the present session of Parliament the first bill to be introduced is one dealing wholly with children, and the enforcement of its many clauses should have the effect of bettering their condition physically, mentally and morally. Smoking by young persons is dealt with in the bill, and the sale of cigarettes or of cigarette papers is prohibited to persons under 16 years of age, and it is made a punishable offense for such children to be found smoking in the streets. Another important section of the bill is that relating to the protection of infant life. Inspection of children put out to rear will be far more stringent than formerly, and it is proposed to legalize the state inspection of all charitable institutions and homes for destitute children.—*Journal Am. Med. Assn.*

USE OF THE X-RAY.—I want to recommend as a means of making the diagnosis in some of these cases that are difficult to reach, the value of the Roentgen ray. It seems to me, we as dentists could not now get along very well without the use of the X-ray in determining the extent of diseased tissue or of caries. Whether the disease has involved other parts may be determined by the use of the X-ray. It is a most valuable means of diagnosis. We often find conditions in which we are unable to determine the source of the irritation. Only yesterday I found in between two molar teeth a supernumerary tooth of the form of a deciduous cuspid. It was wedged in between the first and second molars. It had displaced them and had become the center of infection. This was causing the difficulty, and I was unable to determine what caused the disturbance before using the X-ray, as were three or four other men who had previously treated the patient. One of them brought the case to me, as he could not tell what was the matter. The X-ray explained to us satisfactorily what caused the disturbance. We opened into and removed the supernumerary tooth; the parts were curetted and the patient will undoubtedly get well. There were no means at our command by which we could have settled that question had it not been for the use of the X-ray.—T. W. BROPHY, *Dental Review.*

CARE OF THE TEETH DURING PREGNANCY.—Paddock knows of nothing so efficacious in arresting decay of teeth at this time as milk of magnesia, lime-water, or a solution of sodium bicarbonate, a teaspoonful of soda in a glass of water. One of these should be used as a mouthwash after each meal and at bedtime, the remedial substance being thoroughly forced between the teeth.—*Denver Medical Times.*

ROBBERIES.—Dr. F. D. Taft, Oakland, Cal., office entered April 12 and gold crowns and instruments valued at $40 taken.—Dr. H. C. Mitchell, Aurora, Ill., dental supplies valued at $85, April 11.—Dr. L. E. Klatenbach, Waukegan, Ill., gold to the amount of $25, April 16.—Dr. Margaret Safford, Galesburg, Ill., materials and gold worth $15, April 4.—Dr. John A. Limacher, Joliet, Ill., gold valued at $15, April 12.—Drs. David Kallander and Franklin B. Clemmer, Morgan Park, Ill., gold plates worth several hundred dollars, April 9.—Drs. C. C. Thomas and Mary M. Hawley, Aurora, Ill., gold fillings, etc., valued at $100, April 12.—Dr. William G. Cummins, Chicago, gold and instruments valued at $100, April 8.—Dr. Charles H. Wikoff, Chicago, gold teeth and crowns valued at $150; Dr. Hanford Browne, Chicago, material valued at $125; Dr. Willard Graybeal, Chicago, gold crowns valued at $200, early in April.—Dr. S. W. Young, Birmingham, Mich., gold valued at $50, May 2.—Dr. F. H. Cole, Syracuse, N. Y., bridge work and scrap gold valued at $150, May 1.—Boston Dental Parlors, Salt Lake City, gold fillings and bridge work valued at $100, April 25.—Dr. Sacket, Racine, Wis., gold scrap valued at $50, April 17.

DISTRIBUTION OF PRESSURE IN PACKING.—When I make a set of teeth I invariably cover the cast with tinfoil and make it perfectly smooth, just like a mirror; then I pack the rubber, not in excess, on the alveolar ridge, as it is important you should know when there is enough rubber there. Then I lay on the rubber a piece of the starched cloth that comes on the sheets of rubber so as to be able to separate the flask for examination. In place of bringing the flask down with the ordinary force, where there is not enough rubber put into the flask to fill it, I put in a slight excess and close the flask in boiling water, allowing the excess to escape to the center of the mold. Separate the flask and you will find that in place of forcing the rubber to the outside you have closed the outside and have used the center for the escape, and you will find that it is filled with no excessive pressure on the center. No denture is injured unless you make excessive pressure on the center. If you do make pressure on the outside it does no harm unless it should shrink a little. A flat mouth is not nearly so easily injured as a high arch, because if you fill the center with rubber you are going to expand it both ways in the center; there is absolutely no guesswork about it at all. I always know what I am getting, for when the denture is vulcanized it comes out as bright as a mirror.—C. H. LAND, *Dental Register.*